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CHAPTER 34

NAVIGATION

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NAVIGATION

GENERAL SYSTEM DESCRIPTION

1. INFORMATION

Chapter 34 gives detailed information on units and components in the navigation system.

The information in Chapter 34 can be used, in conjunction with the Wiring Diagram Manual, to give details of the data required to troubleshoot and maintain the navigation system.

2. DESCRIPTION

The navigation system consists of those units and components that allow the flight crew to navigate the airplane safely.

The navigation system has the subsystems that follow:

- Air Data System (ADS)
- Pitot/Static System
- Attitude Heading Reference System (AHRS)
- Automatic Flight Guidance System (AFGS)
- VHF Omni-range (VOR), Instrument Landing System (ILS)
- Radio Altimeter
- Weather Radar System (WXR)
- Enhanced Ground Proximity Warning System (EGPWS)
- Distance Measuring Equipment (DME)
- Automatic Direction Finding (ADF)
- Global Positioning System (GPS)
- Traffic Alert Collision Avoidance System (TCAS)
- Electronic Flight Instrument System (EFIS)

The avionics system is a fully integrated airplane system. This avionics system contains an enhanced version of the traditional avionics and includes new avionics designed for this application (Ref. Figure 1).

Refer to the individual subsystems for the particular operational summaries of that system.

3. NAVIGATION SUBSYSTEMS DESCRIPTION

A. Air Data System

The ADS (Ref. 34-10-19, 001) is a dual system that senses and processes data derived from the air mass around the airplane. The EFIS displays air data on the primary flight displays (PFD). Two air data computers, ADC-3000s, connect to the pitot/static pressure and static systems and to a temperature sensor.

The ADCs process the air data and provide output parameters to the PFDs, multi-function displays (MFD), AHRS computers and the integrated avionics processor system (IAPS) concentrators.

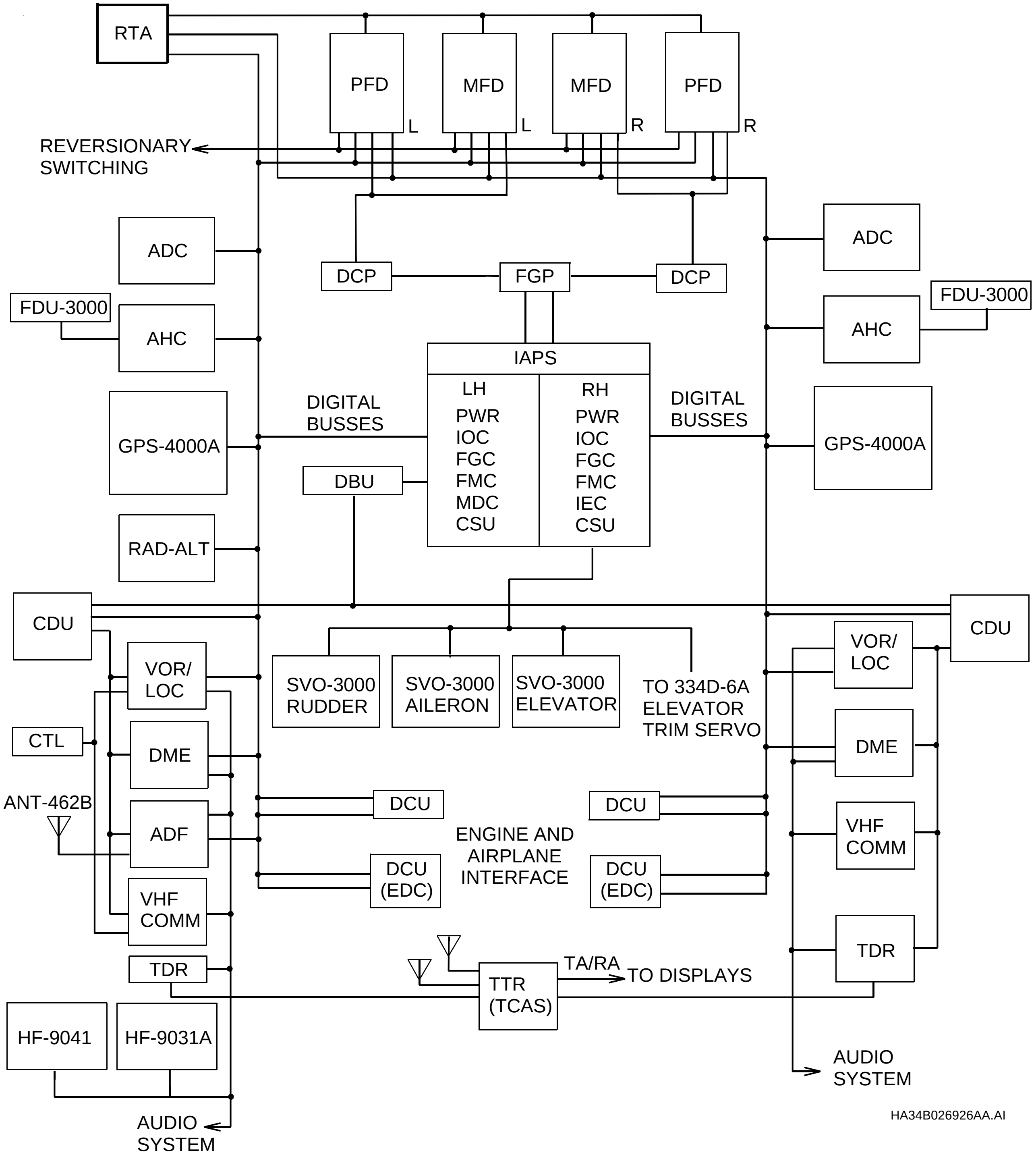


Figure 1
Basic Avionics Installation - Typical Airplane

B. Pitot/Static System

The pitot/static system (Ref. 34-11-19, 001) measures the total pressure created by the forward motion of the airplane and the static pressure of the atmosphere surrounding it in terms of speed, altitude and rate of change of altitude.

Various pipes, connections and unions connect the two pitot masts and the four static vent plates to the ADCs, the stall detector, and the cabin differential pressure indicator. Connections are also supplied for additional equipment.

For Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444:

Two additional wing static vents provide stall identification system pressure.

NOTE: Mod.25G206A or Kit 149-3444 removes the third channel stall detector and disconnects and caps the stall vent piping at the drain plug.

NOTE: Mod.25G206B completely removes the third channel stall detector, the stall vents and the related piping from the wings and fuselage.

All Airplanes:

The pitot/static system is also connected to a separate air data unit (ADU) which is used to provide outputs to the electronic standby instrument system (ESIS) (Ref. 31-20-66, 001).

C. Attitude Heading Reference System

The AHRS (Ref. 34-20-05, 001) is a dual reference system that senses the airplane attitude, heading and 3-axis rate/acceleration. Each AHRS consists of a computer (AHC-3000), a flux detector unit (FDU-3000) and an external compensation unit (ECU-3000).

The AHCs provide attitude and heading parameters to the PFDs and MFDs, the flight guidance computers (FGC) and the IAPS concentrators.

The ECUs contain memory modules that store compensation data for hard iron errors and flux detector misalignments.

The FDUs provide magnetic flux measurements for the AHCs to use when computing the airplane heading.

D. Automated Flight Guidance System

The FMS-6000 (Ref. 34-60-05, 001) is a satellite based navigation system that provides the capability of en route, terminal and nonprecision approach lateral navigation. The system has two flight management computers (FMC-6000), a data base unit (DBU) and is controlled from the two control display units (CDU-6200). The CDU also tunes the VHF COMM, VHF NAV, ADF and ATC transponders.

The FMS also receives data from the GPS, AHRS, ADS, DME and VOR.

E. VHF Omni-range and Instrument Landing System

The VIR-432 VHF NAV receiver (Ref. 34-32-29, 001) contains VOR/LOC, glideslope and marker beacon receivers. The VOR/LOC and glideslope radios are tuned by the FMS CDUs. Data from the various ground radio transmitters is received by the VIR-432 and presented on the EFIS PFDs and MFDs.

F. Radio Altimeter

The ALT-4000 radio altimeter transceiver (Ref. 34-40-05, 001) measures the airplane radio altitude, up to 2,500 feet above the terrain. Radio altitude data is displayed on the PFDs and is also output to the FGCs for use during approach.

G. Weather Radar System

The receiver/transmitter/antenna (RTA-858) (Ref. 34-40-15, 001) is a complete weather radar system in a single line replacable unit (LRU). It detects and locates weather targets for the purpose of navigating around weather hazards. The WRX can also be used to provide ground terrain features.

The WXR is controlled from the display control panels (DCP) on the cockpit glareshield. The system can be selected to display on either or both PFDs or MFDs.

H. Enhanced Ground Proximity Warning System

The EGPWS (Ref. 34-40-35, 001) is effectively three independent systems in one LRU.

The LRU contains the GPWS which produces reactive warnings which help to prevent controlled flight into terrain and is categorized into five modes. The GPWS can also provide a sixth mode, which can include altitude related callouts and/or an excessive bank angle callout.

The enhanced GPWS contains a worldwide database consisting of terrain, airport and other data. The EGPWS provides predictive warnings based on the airplane’s present position, supplied by the FMS or the GPS, and the EGPWS projection of the airplane’s flight path.

Mode seven provides windshear cautions or warnings if the inertial accelerations versus the mass accelerations, along the flight path and perpendicular to the flight path, exceed established threshold values. Windshear alert annunciations appear on the PFDs and MFDs.

I. Distance Measuring Equipment

The dual DME-442 transceivers and antennas (Ref. 34-50-05, 001) compute line of sight distance from the airplane to a ground station, relative closure rate and station identification. The two DME systems are tuned and controlled through the two CDUs and display on the two PFDs.

J. Automatic Direction Finding

The ADF-462 automatic direction finder receiver (Ref. 34-50-15, 001) determines the relative bearing from the airplane to a selected ground station. The ANT-462B antenna is installed to allow for an optional second ADF receiver to be installed in the airplane.

K. Global Positioning System

The GPS-4000A system (Ref. 34-50-45, 001) process the GPS satellite signals to provide navigation data outputs. The system contains two GPS receivers and two GPS antennas. The GPS navigation receivers process the GPS signals from the antennas together with inputs from other airplane sensors to provide position, velocity and time outputs through the input/output concentrators (IOC) to the FMS, the EGPWS and the emergency locator beacon (ELT).

L. Traffic Alert Collision Avoidance System

The TTR-4000 traffic transmitter/receiver (Ref. 34-50-35, 001) functions with the two TDR-94D transponders to provide TCAS II operation. The TDR receives inputs from both air data computers through the IAPS data concentrators. The TTR receives an input from the radio altimeter and from the left AHC-3000. The TTR uses the transponder to establish a mode-S communication link with cooperating airplanes. An audio output is provided from the TTR to the airplane audio system and traffic/resolution advisory outputs to the PFDs and the MFDs.

M. Air Traffic Control

The two TDR-94D transponders (Ref. 34-50-25, 001) each have a top and bottom antenna and an ATC IDENT switch on each glareshield side panel. The system allows ATC ground controllers to quickly locate and identify an individual airplane.

N. Electronic Flight Instrument System

The EFIS (Ref. 34-60-35, 001) provides the means to gather, concentrate and display airplane internal and external information to the flight crew.

The EFIS display is made up of four identical adaptive flight displays (AFD), two display control panels (DCP), the IAPS and four data concentrator units. The four AFDs are arranged across the instrument panels to normally give the pilots the same information. On each main side instrument panel the outboard AFD is configured as a PFD and the inboard AFD is configured as a MFD.

NAVIGATION AERIALS - ADJUSTMENT/TEST

1. General

In-situ testing of aerials is to be done at the periods specified in the Maintenance Schedule.

To make sure that a particular aerial installation is completely serviceable, do one or more of the following tests:

(1)	Low and/or High resistance tests	Do with the aerial feeder cable disconnected at the aerial.
(2)	Voltage standing wave ratio (VSWR) test	Do at the end of the feeder cable distant from the aerial.
(3)	Capacitance test	Do at the end of the feeder cable distant from the aerial.

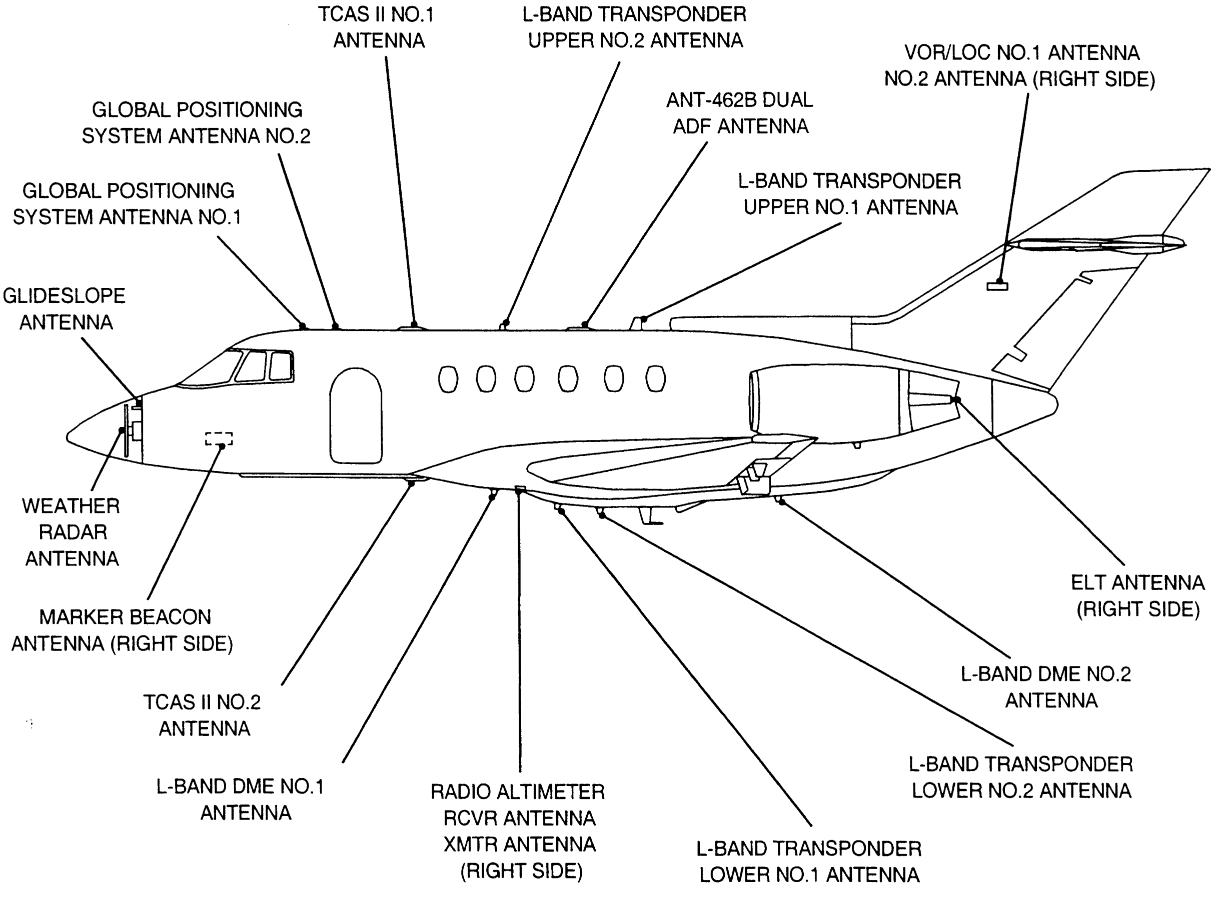
2. Aerials and test procedures *(Figure 501)*

Equipment/Materials	Part/Item No.
Low voltage bonding test ohmmeter.	Local supply
250 volt high resistance bonding test ohmmeter.	Local supply
Capacitance bridge tester.	Local supply
VSWR bridge for all frequencies except 'L' band where a slotted line should be used.	Local supply

Refer to the appropriate Vendor's instruction manual supplied with the test equipment for the test procedure.

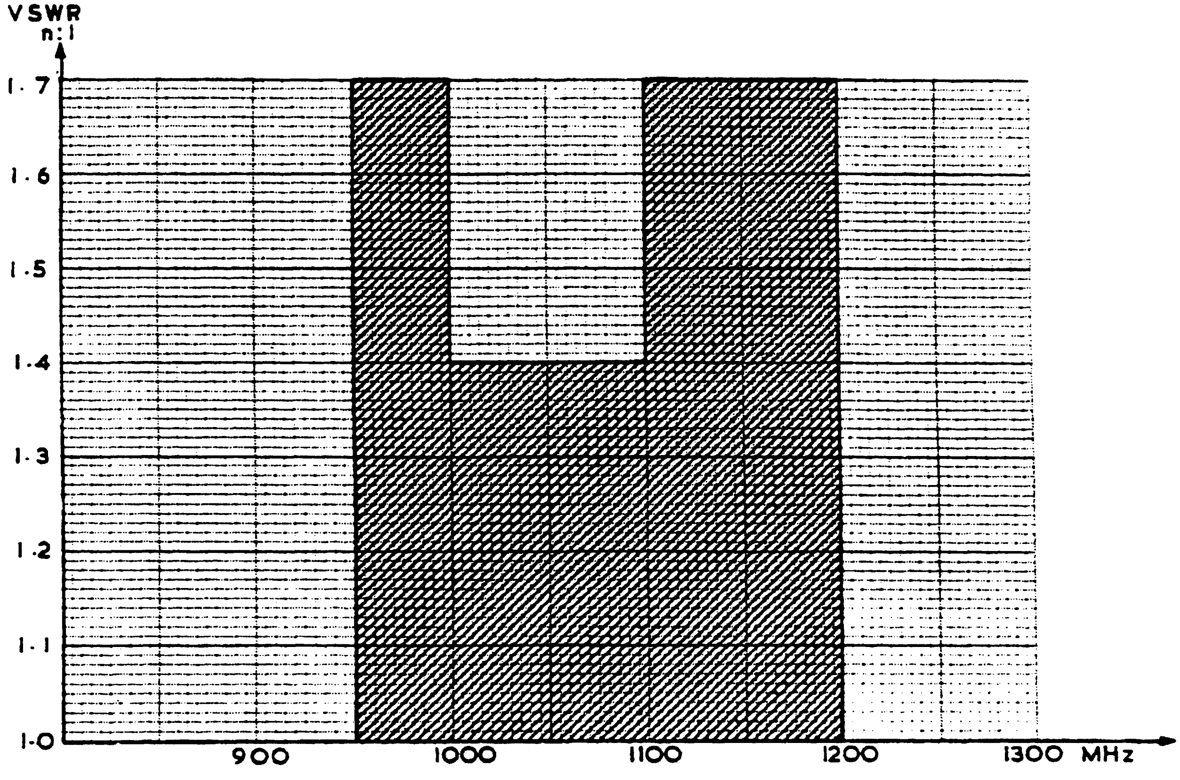
System	Aerial	Test
MARKER	Blade	Make sure that the VSWR on the system is less than 3:1 at 75 MHz.
VOR/LOC	Balanced loop	Make sure that the VSWR on the system is less than 5:1.
DME AND TRANSPONDER	Blade	Make sure that the VSWR on the system lies within the shaded portion of *Figure 502*.
GLIDESLOPE	Blade	Make sure that the VSWR on the system is less than 3:1 at frequencies at the bottom, middle and top of the band.

NOTE: VSWR measurements are to be done between 108 and 118 MHz at approximately 2 MHz increments.
Four sets of measurements are to be taken at each frequency; comprising one from each connector distant from the aerial with the other connector at open circuit (unbalanced) and in circuit (balance-connected to a 50 ohm resistive load).


TCAS II NO.1 ANTENNA
L-BAND TRANSPONDER UPPER NO.2 ANTENNA
VOR/LOC NO.1 ANTENNA NO.2 ANTENNA (RIGHT SIDE)
GLOBAL POSITIONING SYSTEM ANTENNA NO.2
ANT-462B DUAL ADF ANTENNA
GLOBAL POSITIONING SYSTEM ANTENNA NO.1
L-BAND TRANSPONDER UPPER NO.1 ANTENNA
GLIDESLOPE ANTENNA
WEATHER RADAR ANTENNA
MARKER BEACON ANTENNA (RIGHT SIDE)
ELT ANTENNA (RIGHT SIDE)
L-BAND DME NO.2 ANTENNA
TCAS II NO.2 ANTENNA
L-BAND TRANSPONDER LOWER NO.2 ANTENNA
L-BAND DME NO.1 ANTENNA
RADIO ALTIMETER RCVR ANTENNA XMTR ANTENNA (RIGHT SIDE)
L-BAND TRANSPONDER LOWER NO.1 ANTENNA
M6394
HA00B995939AA

General arrangement of navigation aerials

Figure 501



NOTE: ALL MEASUREMENTS ARE TO BE WITHIN SHADED AREA

VSWR curve for aerials operating in the frequency range 900 - 1300 MHz
Figure 502

STANDBY COMPASS (SMITHS E2B) - REMOVAL/INSTALLATION

1. Standby compass

A. Removal

(1) On panel DA-D open, safety and tag all the relevant circuit breakers:

Panel	Label
DA-D	OVHD PNL
DA-D	INST PANEL EMERG

(2) Withdraw the electrical cable from the pins on the lamp housing.

(3) Support each retaining bolt in turn and remove the securing nut and washers; withdraw the bolt. Remove the compass from the mounting bracket.

NOTE: Bolts are installed in the inverted position, with the heads located in the compass slots. Do not drop.

B. Pre-installation check

Visual check

(1) Visually examine the compass. Make sure there is no sign of leaking and that there is not too much cloudiness of the liquid.

(2) Use a deflector magnet to turn the card through 360 degrees, examine the graduations, figures and letters for discoloration and flaws.

(3) Make sure that the B and C corrector indicator and index lines (center of the top face of the mounting plate) are in aligned.

Friction error check

(4) Use the deflector magnet to turn the card through 10 degrees in one direction and keep this deflection for about ten seconds to let the liquid settle.

(5) Release the card and note its settling position.

(6) Do paragraph (1) and (2) again, but with the deflection in the opposite direction.

(7) The angular difference between the two settling positions must not exceed 2.5 degrees.

NOTE: This figure only applies when the test is done in a standard field strength (H) i.e. 0.18 oersted. Where the value of Local H differs from this standard, the corresponding permissible error may be calculated as shown in the following example:

Value of standard H = 0.18 oersted
Value of Local H = 0.30 oersted

Allowable friction error $= 2.5$ *degrees (Standard H)* $\times \frac{0.18}{0.30} = 1.5$ *degrees*

If the compass successfully passes these tests it may be installed. Should serviceability be suspect, the compass must be subjected to the manufacturer's overhaul test procedure.

C. Installation

CAUTION: DO NOT OVERTIGHTEN NUTS.

(1) Align the slots in the compass mounting plate with the holes in the mounting bracket and insert the retaining bolts.

(2) Position the compass so that the bolt heads are installed centrally in the compass mounting plate. Place the light alloy washers over the bolt threads protruding through the top of the mounting bracket. Install and tighten the necessary nuts.

(3) Connect the electrical cable to the lamp housing and, if new cable is being installed, route through to the terminal block and diode. Strap the cable to the canopy top rail drain pipe.

(4) Close the related circuit breakers (Chapter 24, ELECTRICAL POWER).

(5) Energize busbars PE and PS1 (Chapter 24, ELECTRICAL POWER).

(6) On panel CG, set the LTS MASTER switch to ON and make sure that the brilliance of the compass card lighting changes with rotation of the PANEL DIM control. Set the LTS MASTER switch to OFF and make sure that the compass card lighting goes off.

(7) On the LH glareshield set the PANEL LTS switch to EMERG and make sure that the compass card lighting is at maximum brilliance. Set the PANEL LTS switch to OFF and make sure that the compass card lighting goes off.

(8) De-energize the busbars.(Chapter 24, ELECTRICAL POWER).

(9) Do a full compass swing (ADJUSTMENT/TEST).

2. Filament renewal

A. Procedure

(1) Make sure that the new filament is the non-magnetic type, stamped X959121 on the cap.

NOTE: The use of any other filament will cause inconsistent errors in compass indications.

(2) Unscrew the filament retaining cap, located adjacent to the cable connector, and withdraw filament from the coiled spring.

(3) Insert the new filament in the spring coil. Position and secure the filament retaining cap.

(4) Do a functional test on the circuit.

STANDBY COMPASS (SMITHS E2B) - ADJUSTMENT/TEST

A. Compass swing - General

A compass swing must be carried out and compensations (where necessary) done whenever a new compass is installed; on other occasions a check swing is sufficient. The check swing is normally done by placing the airplane on different magnetic headings and comparing the deviations with those on the deviation cards on the pilots' roof panel. If a difference occurs, a complete swing must be carried out. Compasses should be check swung on the following occasions:

(a) When the accuracy of the compass is suspect.

(b) After a major inspection.

(c) After any modification or major replacement involving ferrous metal.

(d) Whenever compass has been subjected to a shock, for example, after a heavy landing.

(e) After airplane has passed through an electrical storm.

(f) Whenever a change is made to the electrical system.

(g) Whenever a change of cargo is likely to affect the compass.

(h) Whenever sphere of operations is changed to one of different magnetic latitude.

(i) After airplane has been standing on one heading for a long period.

NOTE: A check should always be made on each heading to make sure that the interference from each individual item of electrical equipment, its associated wiring, or the interference from the worst combination of possible electrical loads, has not increased. This interference should, normally, not exceed 1° for individual items and 2° for the worst combination.

B. Prepare for swinging

(1) Make sure that all airplane airborne equipment is correctly installed. No items or tools of a magnetic material should be brought into the airplane other than those normally carried as part of the airborne equipment.

(2) If available connect and switch on the ground supply; if ground supply is not available start both engines (Chapter 71, POWER PLANT - GENERAL).

(3) To give normal electrical interference conditions during deviation checks, switch on the following equipment:

(a) Main inverter(s)) As applicable on a particular
) airplane for normal flight conditions.

(b) Flight compartment panel lights.

(c) Pitot heaters
) Restrict continuous operation.
) Only to be switched on during each
) individual heading check. The pitot
) heaters must not be left on for
) more than 5 minutes.

(d) Fuel pumps (if engines are not running)

(4) It is recommended that readings on all related compasses should be taken and all necessary adjustments made as required on each heading at the same time.

C. Swinging procedure

(1) Position the airplane on the approved swinging base to face N. Check alignment of the airplane with a landing compass approximately 50 feet ahead of the airplane nose. Sight with the centre of the radome and the centre line of the vertical stabilizer leading edge. Record readings of E2B compass and reciprocals of landing compass readings (Landing compass reading + 180°).

NOTE: Landing compass shows reciprocal heading of E2B compass reading. Therefore, add 180° to landing compass readings to approximate the E2B reading at N.

(2) Head airplane E and record readings of both compasses.

(3) Head airplane S and record readings of both compasses. Calculate coefficient C from the equation:–

$$C = \frac{N-S}{2}$$ where N and S represent errors on North and South headings respectively.

For example, if error at N = –6 and at S = –2; then $C = \frac{(-6)-(-2)}{2} = \frac{-6+2}{2} = \frac{-4}{2} = -2^\circ$.

(4) Change the sign of coefficient C, obtained in paragraph (3) and add algebraically to the E2B reading. Engage the corrector key over the C spindle and adjust the E2B to read this figure. In the above example the corrector would be adjusted until 182° was aligned with the lubber.

(5) Head airplane W and note reading of both compasses. Calculate coefficient B from the equation:–

$$B = \frac{E-W}{2}$$ where E and W represent errors on East and West headings respectively.

For example, if error at E = +2 and at W = –0; then $B = \frac{+2-0}{2} = \frac{+2}{2} = +1^\circ$

(6) Change the sign of coefficient B, obtained in paragraph (5) and add algebraically to the E2B reading. Engage the corrector key over the B spindle and adjust the E2B to read this figure. In the example of paragraph (5) the corrector would be adjusted until 269° was aligned with the lubber.

(7) On the fourth cardinal point west, calculate the amount of coefficient A. This is derived from the sum of the deviations on:

$$\frac{N + E + S + W}{4}$$

For example $$\frac{-4 + 1 - 4 + 1}{4} = \frac{-6}{4} = -1\,1/2^{\circ}$$

NOTE: If coefficient A is more than 2° do a check on coefficient B and C again.

(8) First note the E2B reading and then loosen the compass retaining bolts. Turn the compass by the amount of coefficient A obtained in Paragraph (7), turn clockwise for 'plus' errors and anti-clockwise for 'minus' errors. Tighten the retaining bolts and do a check again on the E2B reading, which should now be altered by the amount of A coefficient correction applied.

(9) Head the airplane in sequence on quadrantal and cardinal points from W to W, starting at NW. Record readings of both compasses at each heading, then calculate the final coefficient A. This is the result of the sum of the deviations on: $\frac{N,\ E,\ S,\ W,\ NW,\ NE,\ SE,\ SW}{8}$

For example A; $= \frac{-4 + 1 - 4 + 1 + 0 - 1 - 1 - 2}{8} = \frac{-10}{8} = -1\,1/4^{\circ}$

Apply– 1° correction as in paragraph (8).

(10) Record all E2B compass readings obtained after application of coefficient A corrections. (If applicable). Write the log book entries and deviation cards from the corrected readings.

AIR DATA SYSTEM (COLLINS ADC-3000) - DESCRIPTION AND OPERATION

1. Description

A. General

The air data system has the units that follow:

- Two digital air data computers (ADC).

The ADCs receive static air pressure, pitot air pressure, and temperature measurement from the applicable airplane sensors to compute the air data parameters.

The ADS calculates and outputs the air data parameters that follow:

- Pressure altitude (uncorrected)
- BARO corrected altitude
- Barometric pressure (an echo of the received input)
- Total pressure
- Impact pressure
- Static pressure
- Vertical speed (V/S)
- Airspeed (IAS/CAS)
- Mach
- Maximum airspeed (V_{mo}/M_{mo})
- True airspeed (TAS)
- Total air temperature (TAT)
- Static air temperature (SAT)
- ISA delta temperature

The primary flight display (PFD) shows vertical tapes for the air speed indicator (ASI), the altimeter (ALT), and the vertical speed indicator (VSI).

Various air data related bugs can be controlled by the pilot, the flight control system (FCS), or the flight management system (FMS), to increase the pilot's awareness of selected air data reference values.

B. Barometric altitude display

Barometric altitude, in feet, is shown on the PFD as an altitude tape that moves against a fixed position pointer. A rolling-drum digital readout of altitude is shown inside the pointer.

Vertical acceleration from the currently selected attitude/heading source (AHS) can be used to filter the ADC altitude to give a smoother presentation to the pilot. The "filtered ADC altitude" is referred to as inertial altitude.

C. Barometric pressure setting display

The barometric pressure setting is shown digitally below the altitude display. Standard barometric pressure (STD) is set by a push button on the display control panel (DCP). The barometric pressure setting is used to correct the altitude input from the ADC.

The barometric pressure setting can be displayed in either metric units - HectoPascals (HPa) or imperial units - Inches of Mercury (in.Hg). The units are set on each PFD by the left and right BARO PRESS push ON/push OFF switches on the center control pedestal.

D. Preselect altitude display

The preselect altitude (PSA) setting is shown in two places:

- Digitally above the barometric altitude.
- As a preselect altitude reference bug on the barometric altitude scale.

Visual annunciations are provided by automatic color changes of the digital preselect altitude display to amber (altitude alert) or red (failure conditions).

E. FMS flight plan target altitude display

The flight plan target altitude (FPTA) is supplied by the FMS. The FPTA display shows the next vertical constraint in the current flight plan.

F. Vertical speed display

Vertical speed is shown directly to the right of the altitude scale, as a non-linear scale with a pointer. A part-time digital readout of vertical speed is also supplied. Vertical acceleration from the currently selected AHS is used to filter the vertical speed to give a smoother presentation to the pilot. The “filtered vertical speed” is referred to as inertial vertical speed.

G. Selected vertical speed display

Selected vertical speed is a reference value used by the FCS in vertical speed mode. This vertical reference value is shown as a bug against the vertical speed scale, and by a digital readout.

H. FMS vertical speed required advisory pointer

The FMS vertical speed required advisory pointer shows the minimum average vertical speed required to climb (or descend) from the present position to the next climb (or descent) altitude constraint.

I. Airspeed, trend vector and Mach displays

The indicated airspeed is shown on the PFD as an airspeed tape that moves against a fixed-position pointer. A digital readout of the airspeed is shown inside the pointer. An analog airspeed trend vector, attached to the airspeed pointer, gives an approximation of what the airspeed will be in 10 seconds.

A digital indicated Mach number readout is shown beneath the bottom of the airspeed scale. Low speed cues give an approximation of stall speed, but do not serve as a stall warning system substitute. An overspeed cue shows the maximum operating speed of the airplane. Pilot selectable reference speeds are shown. A ground acceleration readout is shown in place of the Mach number when weight on wheels is true.

J. Airspeed alerts

A Vmo/Mmo (maximum airspeed/maximum mach number) marker is constantly shown from the top of the airspeed tape to the current Vmo/Mmo. The marker becomes emphasized and the airspeed digital readout turns red if the airspeed gets significantly above Vmo/Mmo. An overspeed aural additionally alerts the flight crew when Vmo/Mmo is exceeded.

An impending stall speed (ISS) low speed cue (LSC) marker and a reference approach speed (RAS) LSC marker (greenline) are shown on the PFD airspeed display. Both LSC markers are based on airspeed and angle of attack (AOA). Both LSCs are advisory in nature and are not a substitute for any required AOA indications. The LSCs are shown by airspeed and normalized AOA. Normal acceleration is used to stabilize the RAS LSC. The ISS LSC marker is constantly shown from the bottom of the airspeed tape to the current calculated ISS LSC value. The marker becomes emphasized and the airspeed digital readout turns red if the airspeed gets significantly below the ISS LSC value. A green RAS LSC marker is presented above the ISS LSC.

K. Vspeed references, set by pilot or FMS

The two pages of the REFS menu or the FMS is used to set all Vspeeds. Push the corresponding button on the DCP to enable the REFS menu. A movable menu box is shown around the default value of a specific item on the menu. To adjust a menu item, first use the LSK or MENU SET button to select the item, which is shown with a box that flashes. Then use the MENU ADV knob on the DCP to adjust the default value of the item. The Vspeed references are shown on the airspeed Tape.

L. Selected airspeed bug (speed bug)

The selected airspeed reference bug (e.g., speed bug) is shown on the airspeed scale. The speed bug is a general purpose speed reference when it is not controlled by the FCS or FMS. The speed bug shows the speed reference when FCS flight level change (FLC) mode is IAS or Mach. It can be commanded by the FMS in VNAV sub modes.

M. Total air temperature

The total air temperature is a full time digital readout of total air temperature (TAT) on the PFD. TAT is supplied by the currently selected ADC.

2. Operation

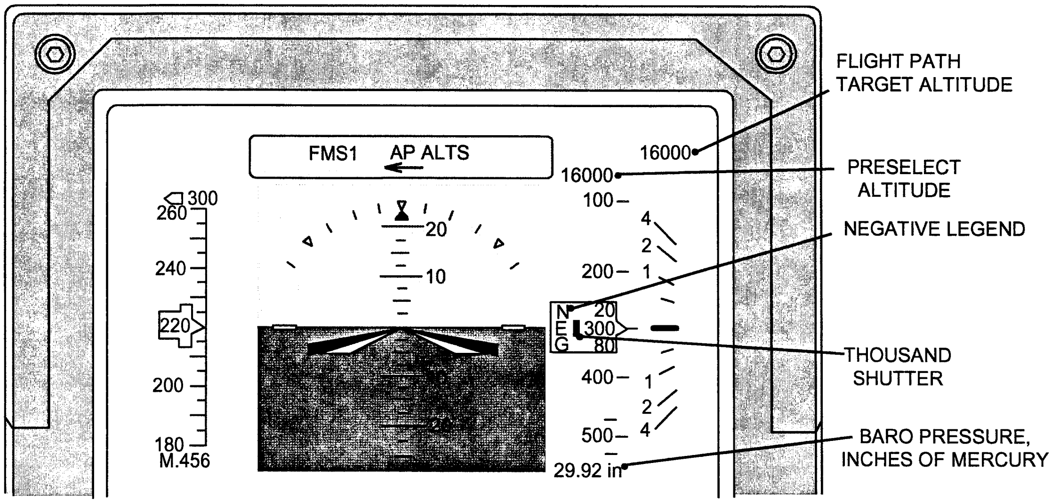
A. Power supplies

ADC 1 is supplied with 28 VDC from PE busbar with backup from BU 3 battery and ADC 2 is supplied with 28 VDC from PS2 busbar with backup from BU 4 battery.

B. Barometric altitude display *(Figure 1)*

(1) Controls

(a) Inertial altitude is shown when sufficiently accurate vertical acceleration is available. When inertial altitude is not available, ADC altitude is shown. The AHS Reversion annunciator/ switch on the left and right lower instrument panels determines which AHS supplies the vertical acceleration to filter ADC altitude.



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Barometric Altitude Symbology
Figure 1

(b) Air data source reversion.
The ADC annunciator/switch selects which ADC will be as the onside air data source. If the No.1 ADC fails the left reversion switch will connect the No.1 (left) PFD and MFD to the No. 2 ADC and display cross-side air data. If the No.2 ADC fails the right reversion switch will connect the No.2 (right) PFD and MFD to the No.1 ADC and display cross-side air data. The PFD message window at the left of the airspeed display is used to annunciate when the onside sensor is not used (alternate source is used), and/or when both sides use a common sensor.

(2) Annunciations

(a) The altitude tape has a blue background color with no border and displays the altitude in feet.

(b) The barometric altitude pointer is a rectangle with a right-facing point (vertex). The pointer is centered vertically in coincidence with the ADI aircraft symbol. The altitude tape moves to always present the current altitude, in feet, at the vertex of the barometric altitude pointer. The pointer has a black background with a grey border.

(c) Digital altitude readout. The current altitude, in feet, is shown as a rolling drum display inside the barometric altitude pointer. The rolling drum digital readout has up-to-5 digits. Green striped shutters cover the Thousands and/or ten thousands digit spaces when a leading zero digit would be in view, except for negative altitudes.

(d) Negative barometric altitudes are shown by a small, white, vertically positioned "NEG" in the ten thousands digit place.

(e) The fine barometric altitude tape is a scale that rotates, with only 450 feet in view at a time. The altitude tape has grey tick marks every 100 feet. There are white 3-digit numerical labels next to each tick mark.

(f) For both the digital readout and the tape, the ten thousands and thousands digits are large white characters while the hundreds, tens and units are medium white characters.

(g) The PFD uses the ADC altitude (uncorrected) input to calculate the current barometric altitude, and uses the value currently set in the barometric pressure display (refer to 2.C) to correct it.

(h) When a barometric altitude flag condition occurs because the altitude has an SSM (sign status matrix) of fail, missing or NCD (no computer data) from the selected ADC, or there is no available barometric pressure for correction, then:

i The barometric altitude tapes, digital thousands readout are removed.

ii A boxed, red, "ALT" flag replaces the barometric altitude pointer, and it flashes for 5 seconds then stays steady.

NOTE: A customer option is available to introduce a metric altitude annunciator/switch. The annunciator/switch activates a metric digital altitude readout and changes the preselect altitude to meters. For more details of the metric altitude annunciator/switch refer to Maintenance Manual Addenda.

C. Barometric pressure display *(Figure 1)*

(1) Controls

(a) The BARO rotary switch on the DCP *(Figure 2)* sets the barometric pressure.

(b) The PUSH STD pushbutton on the DCP sets the barometric pressure to standard (STD). When STD is selected, the barometric altitude display has no correction applied to the altitude input from the ADC.

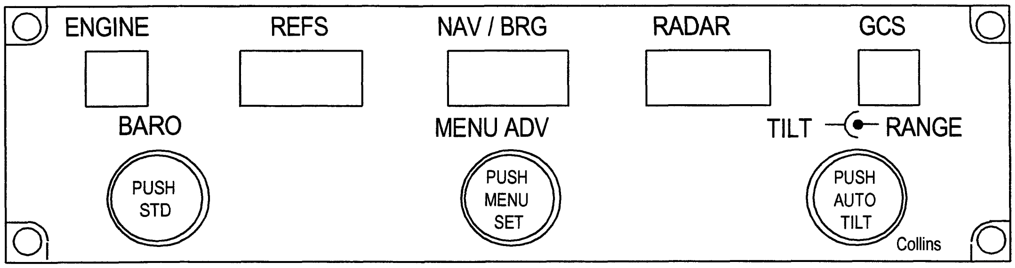
(2) Annunciations

(a) The display is 2 digits, a decimal point and 2 more digits (which represent fractional values) for "Inches of Mercury" (a small size "IN" legend follows the digits). The display is a 3 or 4 digit number for "HectoPascals" (a small size "HPA" legend follows the digits).

NOTE: The selection of the units is controlled by the two BARO PRESS push ON/push OFF switches on the center control pedestal.

(b) The barometric pressure readout and legends are cyan.

(c) The readout is "STD" if the PUSH STD pushbutton on the DCP is pushed, and remains STD until a different barometric pressure is set.



Display control panel
Figure 2

D. Preselect altitude display *(Figure 1)*

(1) Controls

(a) The ALT rotary switch on the flight guidance panel (FGP) *(Figure 3)* sets the preselect altitude. If the ALT rotary switch is in the normal 'out' position, the preselect altitude increments are 1000 feet. If the ALT rotary switch is pushed in against a spring, the preselect altitude increments are 100 feet.

NOTE: With the metric switch option the preselect altitude can be shown in meters with increments of 100 meters or 10 meters.

(b) When BARO MIN is ON, turn the ALT rotary switch to set the preselect altitude to the value of BARO MIN.

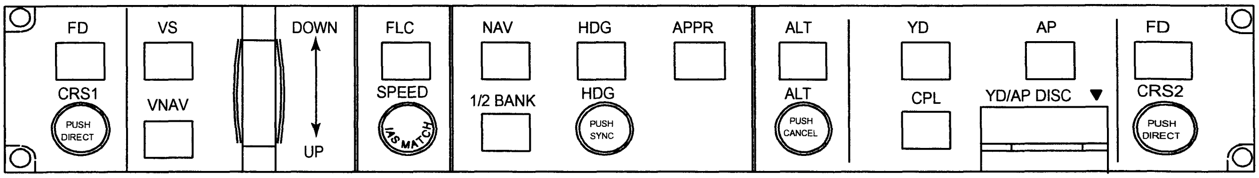
(c) When an altitude alert is active, change the preselected altitude setting or push the ALT rotary switch to cancel the warning.

(2) Annunciations

(a) The digital preselect altitude readout is usually cyan. It is shown above the barometric altitude display. The up-to-5 digit readout does not show leading zeros, except an altitude of zero (sea level) is shown as "000".

(b) When the STD barometric pressure is selected it changes the preselect digital altitude readout:

i If you push the PUSH STD button to select STD barometric pressure, the preselect altitude readout is a 3 digit flight level (FL) preceded by usually cyan "FL" legend. All characters are large.



Flight guidance panel
Figure 3

ii When the barometric pressure is not STD, the preselect altitude readout is large ten thousand and thousand digits and medium hundred, ten and unit digits.

NOTE: *With the metric altitude annunciator/switch option:*
The operation of the metric preselect altitude is almost the same as the imperial, except it has no "FL" capability, and is always shown in medium characters. Metric preselect altitude is followed by the letter "M". The metric preselect altitude is usually cyan.

(c) Preselect altitude is shown on the altitude scale by a preselect altitude reference (bug) placed on the fine altitude tape and/or on the left side of the barometric altitude tape. The bug has a sideways "W" that matches the barometric altitude pointer.

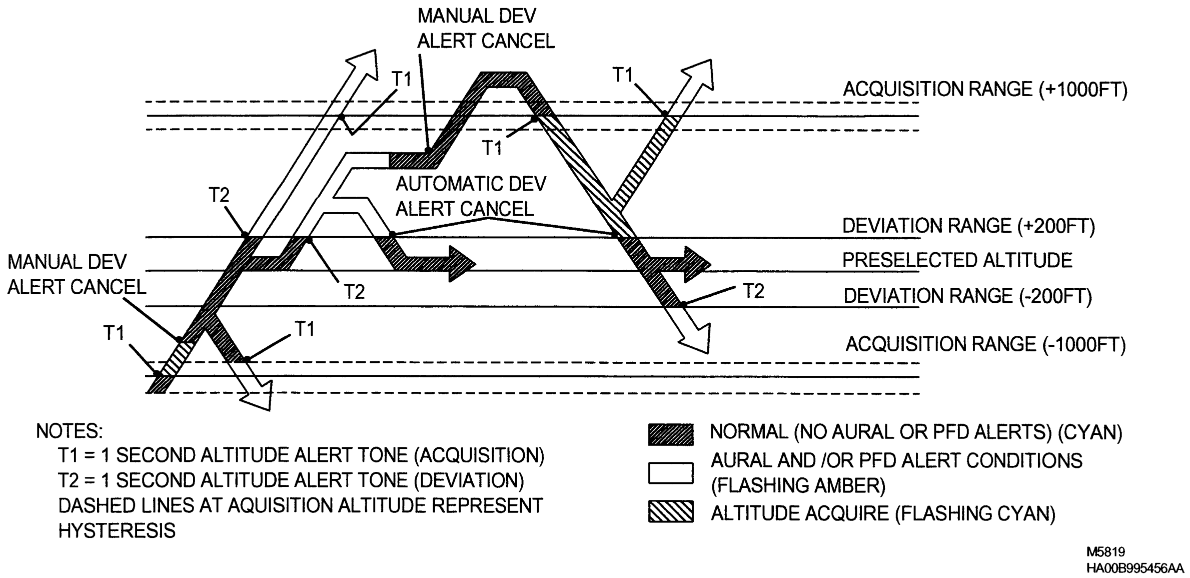
(d) Preselect altitude alert limits *(Figure 4).*

i The preselect altitude readout flashes cyan and the cockpit aural warning sounds (typically "C-cord", the sound is created by the aural warning system for 1 second when the barometric altitude closes within the acquisition limit.

ii The preselect altitude readout continues to flash until either the barometric altitude closes to within the deviation limit, or the ALT knob on the FGP is pushed.

iii The preselect altitude readout flashes amber and the cockpit aural warning sounds for 1 second if the barometric altitude exits the deviation limit. The readout continues to flash until either the barometric altitude is within the deviation limit, or a new preselect altitude is selected, or the ALT knob on the FGP is pushed.

iv The preselect altitude readout flashes cyan and the cockpit aural warning sounds for 1 second if the barometric altitude closes within the acquisition limit, but does not cross the deviation limit, and then exits the acquisition limit. The readout changes to amber when it crosses the acquisition limit and continues to flash until either within the deviation limit, or a new preselect altitude is selected, or the ALT knob on the FGP is pushed. The aural warning sounds for 1 second each time the acquisition limit is crossed.


MANUAL DEV ALERT CANCEL
T1
T1
T1
ACQUISITION RANGE (+1000FT)
T2
AUTOMATIC DEV ALERT CANCEL
DEVIATION RANGE (+200FT)
MANUAL DEV ALERT CANCEL
PRESELECTED ALTITUDE
T2
T2
DEVIATION RANGE (-200FT)
T1
T1
ACQUISITION RANGE (-1000FT)
▨ NORMAL (NO AURAL OR PFD ALERTS) (CYAN)
☐ AURAL AND /OR PFD ALERT CONDITIONS (FLASHING AMBER)
▧ ALTITUDE ACQUIRE (FLASHING CYAN)
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NOTES:
T1 = 1 SECOND ALTITUDE ALERT TONE (ACQUISITION)
T2 = 1 SECOND ALTITUDE ALERT TONE (DEVIATION)
DASHED LINES AT AQUISITION ALTITUDE REPRESENT HYSTERESIS

Altitude Alerting Operation
Figure 4

E. **FMS flight plan target altitude display** *(Figure 1)*

(1) Controls

(a) The flight plan target altitude display (FPTA) is provided by the FMS. The FPTA is a function of the current flight plan and the airplane's position with respect to that flight plan. FPTA is shown only when FMS is the active Nav source.

(2) Annunciations

(a) The magenta FPTA is shown as an up-to-5 digit readout. It is shown above (and to the right) of the preselect altitude, and is in medium characters.

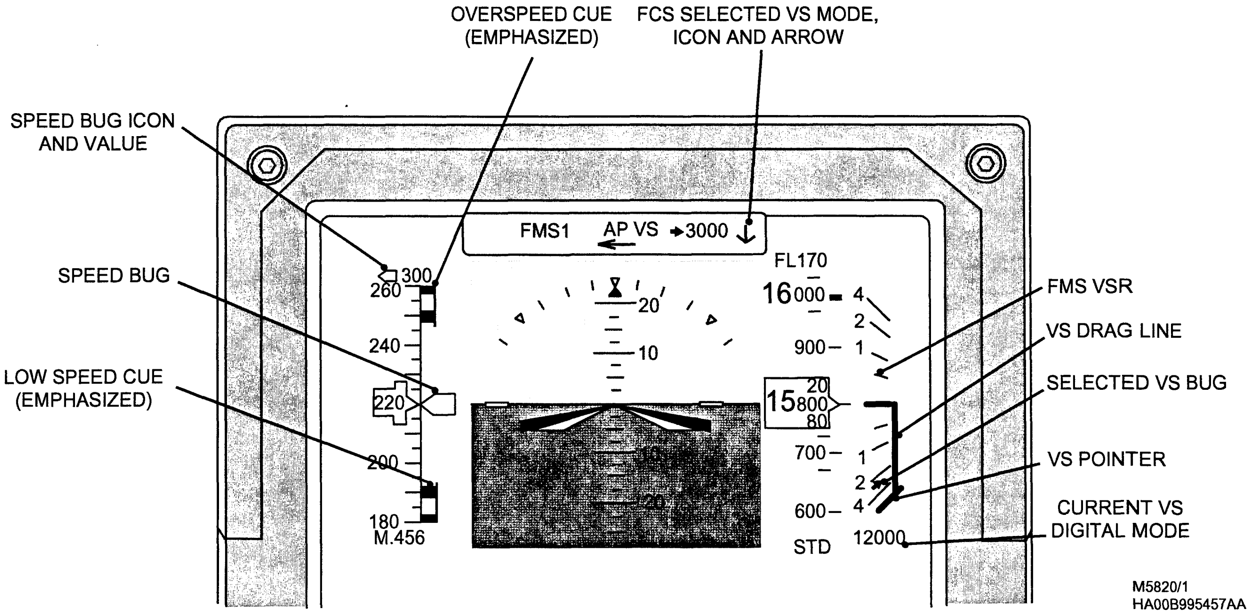
(b) A zero altitude (sea level) is shown as "000". Negative altitudes are shown by a cyan "minus" sign ("–") which precedes the readout.

(c) The FPTA display is always the exact value the FMS sends, shown in feet.

F. **Vertical speed display** *(Figure 5)*

(1) Controls

(a) There are no controls that are specifically for the vertical speed display. The ADC reversion switch controls which ADC supplies vertical speed information. The AHS reversion switch determines which AHS supplies vertical acceleration to filter the vertical speed with.



Vmo/Mmo and vertical speed
Figure 5

(2) Annunciations

(a) Analog vertical speed (VS) is shown as a pointer with an integral “drag line” against the VS scale. The present value of vertical speed is shown as a green pointer against the VS scale. The VS symbology has a blue background color and no border. The VS scale is non-linear, and shows vertical speed between ± 4000 feet per minute (fpm). The usually green VS pointer turns red if it points in the red portion of a TCAS resolution advisory.

(b) If valid inertial vertical speed is not shown and if the ADC vertical speed has an SSM (Sign Status Matrix) of NCD (No Computer Data), fail or missing:

i The VS scale and pointer, and digital readout, are removed.

ii A red, boxed “VS” flag is shown in the center of the VS scale. The VS flag flashes for 5 seconds and then stays steady.

(c) A part-time display of the present value of vertical speed is shown digitally either at the top or at the bottom of the VS scale. If the airplane climbs at greater than 300 fpm, the vertical speed is shown digitally at the top of the VS scale. If the airplane descends at greater than 300 fpm, the vertical speed is shown digitally at the bottom of the VS scale. The green digital value of vertical speed is shown in an up-to-five digit field.

G. Selected vertical speed display *(Figure 5)*

(1) Controls

(a) The VS/Pitch wheel on the FGP is used to change the selected VS reference value in the FCS VS mode.

(b) When FCS VS mode is selected, the VS readout in the PFD's FCS mode field appears, and is preceded by a VS bug icon, and followed by an arrow. Arrow direction is up for a selected climb or down for a selected descent. No arrow is shown for a selected vertical speed of zero. The digital display, icon and arrow are boxed while the VS/Pitch wheel is in motion. The box is removed 5 seconds after no VS/Pitch Wheel activity, but the readout, icon and arrow remain in view as long as the FCS VS mode is active.

(c) The selected VS reference value is set to the current vertical speed upon FCS VS mode selection, then changed with the VS/Pitch wheel located on the FGP.

(d) The CPL switch on the FGP selects which PFD controls the selected VS reference value. If CPL is to the pilot, the pilot's side PFD is the master. If CPL is to the copilot, then the copilot's PFD is the master.

(2) Annunciations

(a) The selected VS bug is a cyan "Arrowhead" icon. The FCS mode digital readout, arrow, and miniature icon are cyan. The digital readout is 3 or 4 digits.

(b) If the FCS VS mode becomes invalid, the bug icon and the value have the "mode strike-out" line extended through them.

H. FMS vertical speed required advisory pointer *(Figure 5)*

(1) Controls

(a) The FMS must be the active Nav source before the PFD will allow the FMS vertical speed required (VSR) to be shown.

(2) Annunciations

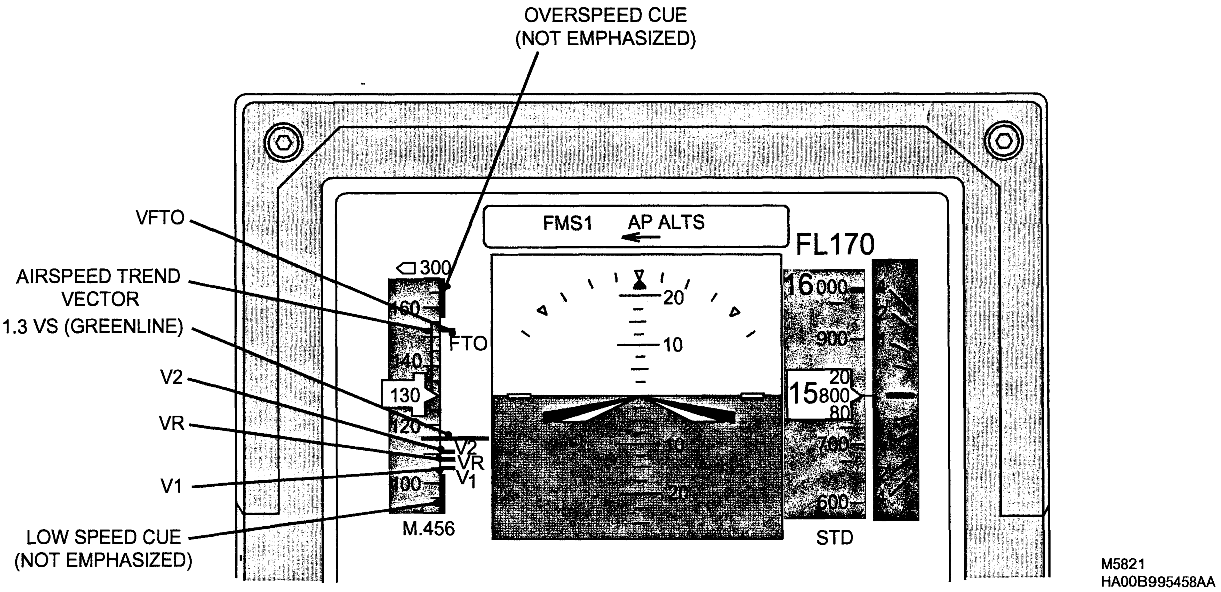
(a) The FMS VSR is a magenta open circle, shown on the vertical speed scale.

I. Airspeed, trend vector and mach displays *(Figure 6)*

(1) Controls

(a) There are no controls specifically for the airspeed display.

(b) The ADC reversion switch controls which ADC supplies airspeed information. The AHS reversion switch controls which AHS supplies longitudinal acceleration and pitch angle.



Airspeed symbology

Figure 6

(2) Annunciations

(a) The airspeed symbology has a blue background color and no border.

(b) The airspeed pointer has grey lines which form a “fat flashlight” with a pointer (vertex). The pointer is centered vertically in coincidence with the ADI aircraft symbol center. The airspeed tape moves to always show the current airspeed at the vertex of the airspeed pointer.

(c) The current airspeed is shown in a rolling drum inside the airspeed pointer. The rolling drum digital readout consists of up-to-3 digits, with 1 knot increments. All digits are white.

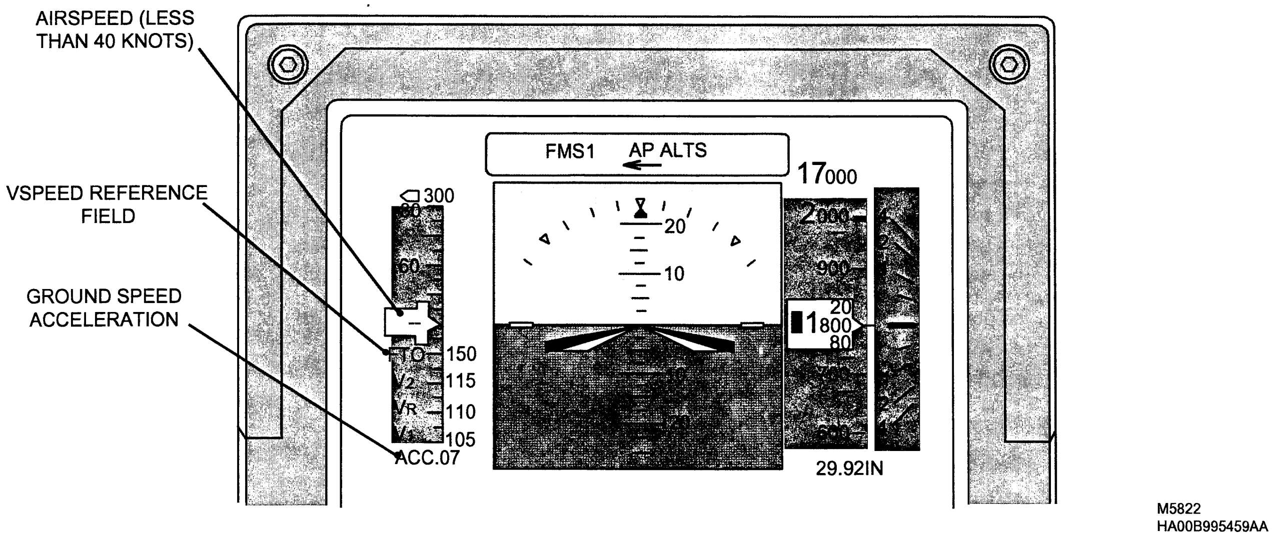
(d) If airspeed is negative, or the SSM is fail, missing or NCD, the airspeed digital readout, airspeed scale, overspeed marker, and low speed cue markers are removed and replaced with a boxed red “IAS” flag, which replaces the airspeed pointer, flashes for 5 seconds, then stays steady.

(e) The airspeed tape utilizes a scale that moves, with a fixed pointer.

(f) The airspeed trend vector is a thermometer type display which has a magenta line of double line-width, and extends directly out from the airspeed pointer. The trend vector goes up to show an increase in airspeed trend, or down to show a decrease in airspeed trend. The AFD uses the airspeed and data from the currently selected AHS to calculate the trend vector.

(g) The Mach or ground acceleration display is a digital readout located at the bottom of the airspeed scale *(Figure 7).*

i While airborne, the display is a white 3-digit readout of Mach number preceded by a decimal point. A gray scaled “M” legend appears in front of the readout.



Ground Acceleration Symbology
Figure 7

ii While on the ground, the display is a magenta 2-digit readout of longitudinal acceleration preceded by a decimal point. The digits are preceded by a magenta "-" if longitudinal acceleration is negative. A gray scaled ACC legend appears in front of the readout at all times.

J. **Airspeed alerts** *(Figure 5)*

(1) Controls

(a) OVERSPEED TEST switch(es) test the overspeed aural alert discrete output of each PFD. OVERSPEED TEST is functional only when the PFD receives weight on wheels.

(b) Overspeed is calculated from data supplied by the currently selected ADC. Vmo and Mmo are constants stored in the ADC, based on airplane type. Vmo/Mmo is calculated by the ADC as a function of airplane type, airspeed and altitude.

(c) ISS LSC and RAS LSC are determined from airspeed data supplied by the currently selected ADC and normalized AOA data supplied from the DCU. Normal acceleration from the currently selected AHS is used to stabilize the RAS LSC display.

(2) Annunciations *(Figure 6)*

(a) The red Vmo/Mmo marker is shown as a triple line width vertical line on the Airspeed scale, from the current Vmo/Mmo to the top of the airspeed Scale.

i The bottom of the Vmo/Mmo marker is positioned at Vmo until the Mmo becomes more restrictive, then the marker bottom is positioned at the airspeed that corresponds with the Mmo, for the current altitude.

ii Overspeed pre-alert occurs when the airspeed trend vector exceeds the Vmo/ Mmo by the Trend Vmo/Mmo Delta (3 knots for 5 seconds or more). To emphasize it, the Vmo/Mmo marker changes to a wider red and “red outlined black” checker board pattern. The airspeed digital readout changes color to amber and flashes for 5 seconds, then stays steady.

iii Overspeed alert occurs when the current airspeed becomes greater than Vmo/ Mmo by the Vmo/Mmo Delta (3 knots). To emphasize it, the Vmo/Mmo marker changes to a wider red and “red outlined black” checker board pattern. The airspeed digital readout changes color to red and flashes for 5 seconds, then stays steady.

(b) The red ISS LSC marker is shown as a triple line width vertical line on the airspeed scale, from the current LSC value to the bottom of the airspeed scale.

i ISS LSC pre-warn occurs when the airspeed trend vector goes below the ISS LSC by the trend ISS LSC Delta (3 knots for 5 seconds or more). To emphasize it, the ISS LSC marker changes to a wider red and “red outlined black” checker board pattern. The airspeed digital readout changes color to amber and flashes for 5 seconds, then stays steady.

ii ISS LSC warn occurs when the current airspeed becomes less than ISS LSC by the ISS LSC Delta (3 knots). To emphasize it, the ISS LSC marker changes to a wider red and “red outlined black” checker board pattern. The airspeed digital readout changes color to red and flashes for 5 seconds, then stays steady.

K. Vspeed References, Set by Pilot or FMS *(Figures 6, 8 and 9)*

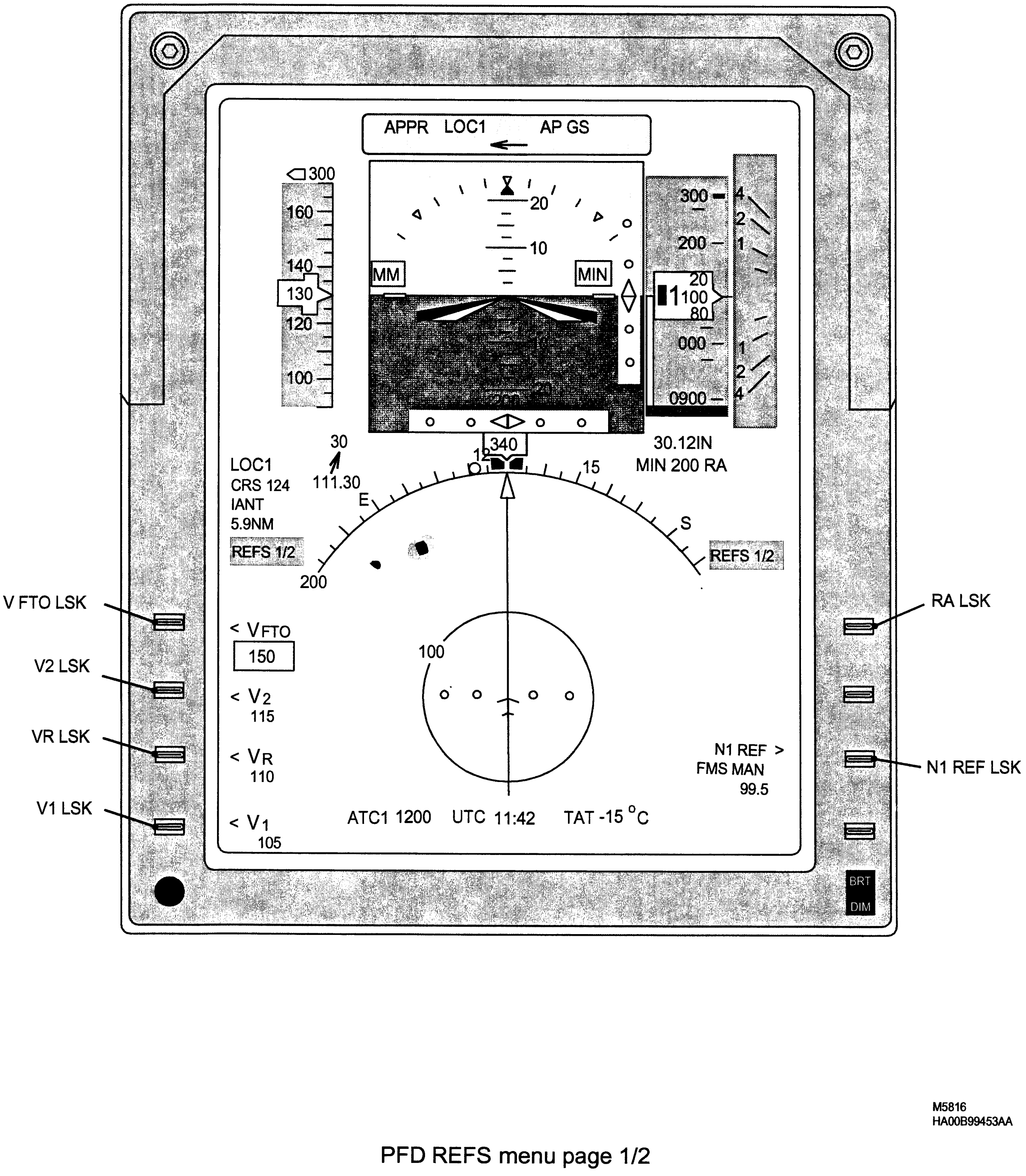
(1) Controls - set by pilot

(a) The REFS menu is used to start Vspeed, RA MIN, BARO MIN or N1 REF selection.

i Push the REFS pushbutton on the DCP to select the REFS menu.

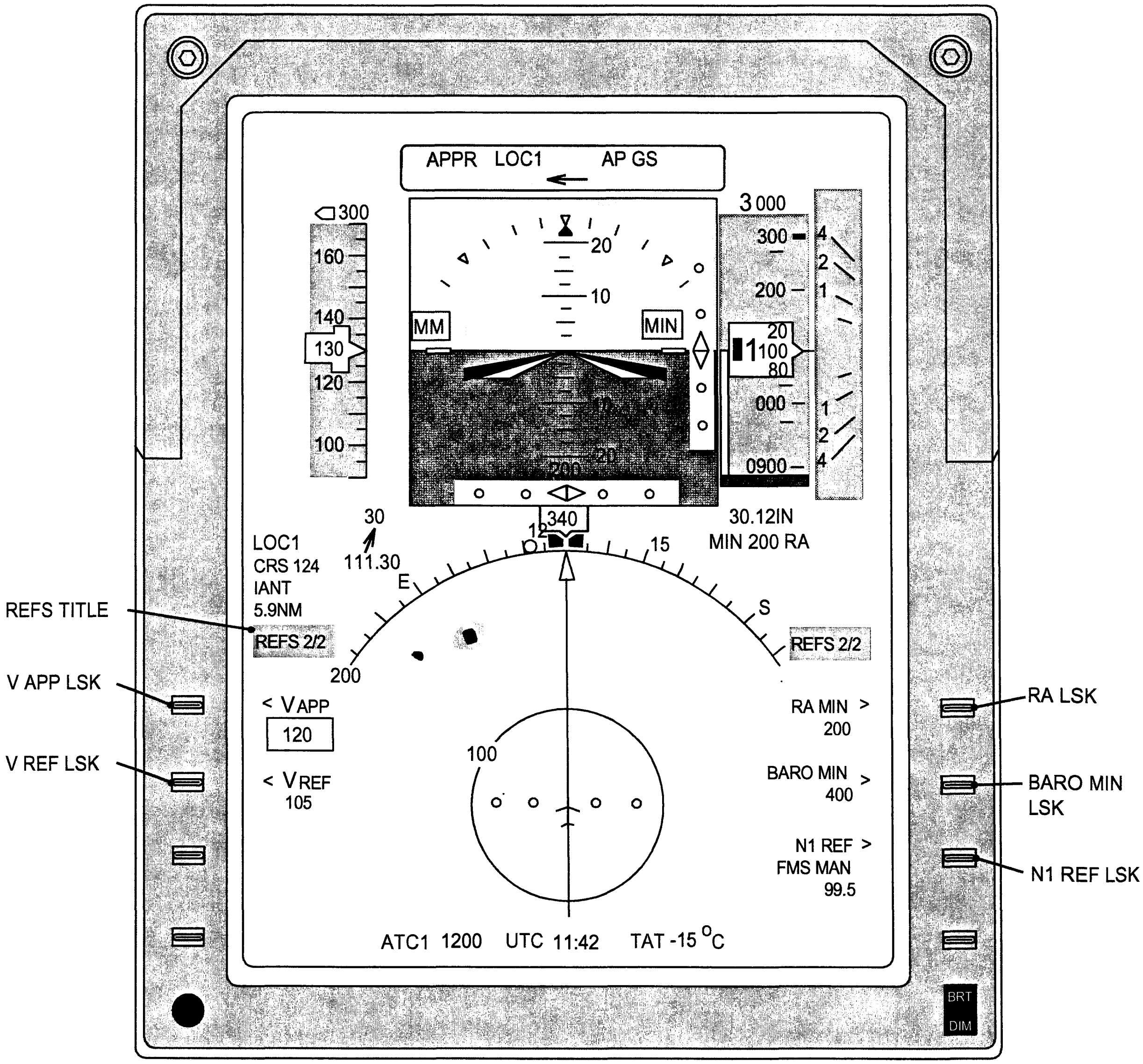
ii A menu title is usually provided when the REFS button is pushed. “REFS” is shown in white letters on a sky blue background. The active page number and total number of pages are shown in white digits with a white slash (1/2, 2/2) on the sky blue background.

iii When the airplane is on the ground (weight on wheels is true), page 1 is the first page shown when the DCP's REFS button is pushed. A second push of the REFS button calls up page 2. A third push of the REFS button removes the REFS Menu and returns the PFD to normal operations.



PFD REFS menu page 1/2

Figure 8



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PFD REFS menu page 2/2
Figure 9

iv When the airplane is in the air (weight on wheels is not true), page 2 is the first page shown when the DCP's REFS button is pushed. A second push of the REFS button calls up page 1. A third push of the REFS button removes the REFS menu and returns the PFD to normal operations.

v The menu is automatically removed after 10 seconds of no activity. The menu will not be automatically removed if the menu box flashes.

(b) The movable cyan menu box must be around the desired REFS menu item in order to change the value of that item manually. Whenever either page of the REFS menu is initially selected in view, the menu box is placed around an appropriate default item's set value. When the menu box is around the desired settable value, push the MENU SET button, or push the associated LSK, to make the menu box flash. This shows that the settable value is ON and can be changed. When the box flashes it cannot be moved by rotating the MENU ADV knob.

(c) The selected settable value shall be changed when the menu box flashes and the MENU ADV rotary switch is turned.

(d) The REFS menu items not selected for display on the PFD are shown in smaller white characters in the menu. These items are referred to as OFF. The REFS menu items that have been manually set and selected for display are shown in larger cyan characters. These items are referred to as ON.

(e) V1, VR, V2, VFTO, and N1 REF are set from page 1 of the REFS Menu. VAPP, VREF, RA MIN, BARO MIN and N1 REF are set from page 2 of the REFS Menu (N1 REF is on both pages of the REFS Menu).

(2) Controls - set by FMS

(a) When FMS values are sent to the display, an entire set of either takeoff (V1, VR, V2, VFTO or approach (VAPP, VREF) values must be initially sent to the display. If any of the given set of values are not sent to the display, none of the FMS values will be shown on the REFS menu, speed reference field, or airspeed tape. in this case, the previous values will be kept.

(b) When a set of FMS Vspeed values are shown, they will be shown in magenta adjacent to the appropriate LSK on the REFS menu. In addition, the values are set as ON and posted on the airspeed tape, except they will also be shown in magenta.

(c) If an FMS-generated value reverts to manual state, you can only restore the FMS-generated value and state if you send the entire set (either takeoff or approach) of FMS-generated values again via the CDU SEND indication.

(3) Annunciations

(a) Each Vspeed is 2 or 3 digits, with one knot resolution, and leading zeros are suppressed.

(b) The REFS menu Vspeed readouts, airspeed tape bugs, and speed reference field legends and readouts are magenta when set by the FMS and cyan when set by the pilot.

(c) "V1" is the take-off decision speed reference, shown on the airspeed tape as a horizontal line with "V1" adjacent to the line.

(d) "VR" is the rotation speed reference, shown on the airspeed tape as a horizontal line with "VR" adjacent to the line.

(e) "V2" is the take-off safety speed reference, shown on the airspeed tape as a horizontal line with "V2" adjacent to the line.

(f) "VFTO" (V final take-off climb (FTO)) is shown on the airspeed tape as a horizontal line with "FTO" adjacent to the line.

(g) "VREF" (V landing reference speed (REF)) is shown on the airspeed tape as a horizontal line with "REF" adjacent to the line.

(h) "VAPP" (V approach (APP)) is shown on the airspeed tape as a horizontal line with "APP" adjacent to the line.

(i) All legends shown on the REFS menu (V1, VR, V2, VFTO, VAPP, VREF, RA MIN, BARO MIN and N1 REF) are white.

L. Selected airspeed bug (speed bug) *(Figure 5)*

(1) Controls

(a) The SPEED rotary switch on the FGP sets the value of the speed bug.

(b) The speed bug icon and associated speed bug readout are full time displays.

i The IAS/MACH push button on the FGP selects either IAS or Mach for the speed bug reference, and the value will be in knots or Mach accordingly.

ii The PFD controls whether IAS or Mach is the active reference.

iii The FGC can command the speed bug to a specified value or sync it to the current airspeed/MACH when FLC is the active FCS mode.

iv The PFD automatically changes the speed reference from IAS to Mach when climbing through 27,000 feet of altitude, and changes the speed reference from Mach to IAS when descending through 27,000 feet of altitude.

(c) The FGP CPL switch selects which PFD controls the speed value. If CPL is to the pilot, the pilot's PFD is the master. If CPL is to the copilot, then the copilots PFD is master.

(2) Annunciations

(a) The speed bug, readout, and icon are cyan when set with the speed rotary switch or via the FCS, and magenta when set by the FMS. The bug is a box with 3 sides in the shape of a rectangle and the fourth side in the shape of a pointer, which points at the selected airspeed on the airspeed tape.

i The speed bug icon and a digital readout are shown above the airspeed display.

ii When IAS is active, the icon and an up-to-3 digit display of the IAS value is shown, with leading zeros suppressed.

iii When MACH is active, the icon, letter M, and a two digit display of the Mach value, with leading decimal point and leading tenths and hundredths zeros, if required, is shown.

iv A miniature speed bug ICON and the current value (IAS or MACH), in the same color as the speed bug display, also appear in the FCS annunciations field when FCS FLC mode is active.

M. Total air temperature

(1) Controls

(a) The ADC source select switch determines which ADC supplies the TAT.

(2) Annunciations

(a) Total air temperature display:

i A full time Bright Grey TAT Legend precedes the digital readout and a Bright Grey "°C" Legend is shown after the digital readout.

ii The digital readout is white.

iii A white minus sign "-" precedes the readout for negative values.

iv TAT is always shown in degrees C.

NAVIGATION
FLIGHT ENVIRONMENT DATA
AIR DATA SYSTEM (COLLINS ADC-3000)
REMOVAL/INSTALLATION

1. AIR DATA COMPUTER

A. Remove Air Data Computer

	MECH	INSP
(1) Open, safety and tag the relevant circuit breakers listed below (Ref. 24-01-00, 201): **Panel** — **Label** DA-A — ADC 1 PRI DA-A — ADC 1 SEC DA-A — ADC 2 PRI DA-A — ADC 2 SEC		
(2) Remove the necessary equipment and panels to get access to the ADCs on the flightdeck, under the right seat; ADC 1 is upper, ADC 2 is lower.		
(3) Disconnect the pitot and static pipelines from the unit front panel; install blanking caps to the unit and pipelines.		
(4) Cut and remove the locking wire and slacken the securing clamps.		
(5) Carefully pull the unit straight forward out of the mount and install dust caps to the connectors on the mount and the unit.		

B. Install Air Data Computer

	MECH	INSP
(1) Remove the dust caps from the connectors and carefully push the unit squarely into the mount until the rear connectors are correctly mated.		
(2) Engage and tighten the securing clamps and wirelock.		
(3) Remove the blanking caps from the unit and pipelines, and connect the pitot and static pipelines to the unit front panel.		
(4) Remove the safety tags and close the relevant circuit breakers (Ref. 24-01-00, 201).		
(5) Do the test procedure (Ref. 34-10-19, 501).		

C. Close Up

	MECH	INSP
(1) Install any equipment or panels removed for access at paragraph 1.A. (2)		
(2) Make sure the work area is clean, clear of tools and any other items of equipment.		

NAVIGATION
FLIGHT ENVIRONMENT DATA
AIR DATA SYSTEM (COLLINS ADC-3000)
ADJUSTMENT/TEST

1. INFORMATION

When the Air Data System pitot/static pipelines have been disconnected a pitot/static system plumbing leak test must be performed as specified in paragraph 2.A. and 2.B. of 34-11-19, 501 prior to the following test. During the performance of this test procedure, if any breaks are made to the airplane pitot/static system, a pitot/static system plumbing leak test must be repeated (Ref. 34-11-19, 501).

Equipment/Material	Part/Item No.
Pitot/Static Test Set	Druk or equivalent
Adapter - Pressure Head	20293 (Ref. ITEM 34-10-02)
Adapter(s) - Expanding	25YTS129R21A (Ref. ITEM 34-10-03) or equivalent, Ref. components found in Nav-Aids Kit ADA125-612, or Nav-Aids Kit ADA125-945
Blank(s) - Expanding	25YTS129R23A (Ref. ITEM 34-10-04) or equivalent, Ref. components found in Nav-Aids Kit ADA125-612, or Nav-Aids Kit ADA125-945
U-connections	TS116R-5
U-connections	TS116R-3

2. TEST PREPARATION

NOTE: Make sure that all relevant circuit breakers remain set and do not trip during the test. No adverse affects or malfunctions are found.

A. Pitot/Static Test Set Up

(1) On roof panel CG, make sure that the PITOT/VANE HEAT L and R switches are set to OFF.

(2) Energize the DC busbars (Ref. 24-01-00, 201, Figure 201).

(3) Make sure that the relevant circuit breakers are closed as follows:

Panel	Label
DA-A	ADC1 PRI
DA-A	ADC2 PRI
DA-A	ADC1 SEC
DA-A	ADC2 SEC

(4) Make sure that the PITOT ISOLATION valve control on the right console is in the NORMAL (open) position.

(5) Do not energize the test set at this time.

(6) Connect the adapter - pressure head, adapter(s) - expanding to the pitot/static test set and the appropriate airplane ports. Install blanks - expanding to the airplane ports as required.

(7) Set up the pitot/static test set as follows:

Suction Rate	CLOSED
Pressure Rate	CLOSED
Coupler	CLOSED
Suction Bleed	CLOSED
Pressure Bleed	CLOSED

3. TEST PROCEDURE

A. Power Up

(1) Connect the external 28 Vd.c. power supply to the airplane (Ref. 24-01-00, 201).

(2) On the roof panel, set the EXT PWR, BATT and BATT/CHARG to ON.

(3) At the Primary Flight Display (PFD) 1/2 make sure the airspeed, altitude and vertical speed displays are valid.

B. Air Data Computer (ADC) 1/2, Indicated Airspeed Test

(1) Energize the pitot/static test set.

(2) Make sure that the pitot/static test set is set as follows:

Suction Rate	CLOSED
Pressure Rate	CLOSED
Coupler	CLOSED
Suction Bleed	CLOSED
Pressure Bleed	CLOSED

(3) Slowly open the pitot/static test set Pressure Rate valve to increase airspeed, then close the Pressure Rate valve when the first test point is reached in Table 501. Record indicated airspeed readout, make sure that it is within the specified tolerance range of Table 501.

(4) Repeat paragraph 3.B. (3) for the remaining test points in Table 501.

Table 501
Air Data Computer 1/2, Indicated Airspeed Test

IAS (kts)	IAS Tol (kts)	ADC 1 IAS	ADC 2 IAS
50	± 5		
60	± 5		
70	± 4		
80	± 3		
90	± 2.5		
100	± 2		
120	± 2		
150	± 2		
200	± 2		
250	± 1.5		
300	± 1		
350	± 1		

NOTE: IAS ± tolerance does not include pitot/static test set error tolerance.

(5) Slowly open pitot/static test set Pressure Bleed Valve to decrease airspeed to 0 knots.

C. ADC 1/2, Overspeed Test

NOTE: Altitude tends to decrease in the next step. Altitude must be maintained for this step. The Suction Rate valve can be slowly opened and closed to compensate for lost altitude.

CAUTION: *Do not exceed 5,000 fpm climb/descent rates.*

(1) Set up the pitot/static test set as follows:

Suction Rate	CLOSED
Pressure Rate	CLOSED
Coupler	OPEN
Suction Bleed	CLOSED
Pressure Bleed	CLOSED

(2) Slowly open the pitot/static test set Suction Rate valve to increase altitude to 12,000 feet, and then close the Suction Rate valve.

(3) Close the pitot/static test set Coupler valve. Slowly open the pitot/static test set Pressure Bleed valve to increase airspeed to 339 kts and then close the Pressure Bleed valve. Make sure the Overspeed aural alert is heard when the IAS exceeds 335 kts.

NOTE: When ventral tank is not empty the Overspeed aural alert is heard when IAS exceeds 280 kts.

(4) Slowly open the pitot/static test set Coupler valve to decrease airspeed to 0 kts, and then fully open the Coupler valve. Slowly open the Pressure Bleed valve to decrease altitude to Field Elevation.

D. Barometric Scale Error Test

CAUTION: *Do not exceed 5,000 fpm climb/descent rates.*

(1) Set up the pitot/static test set as follows:

Suction Rate	CLOSED
Pressure Rate	CLOSED
Coupler	OPEN
Suction Bleed	CLOSED
Pressure Bleed	CLOSED

(2) Using the BARO knob on the Display Control Panel (DCP) 1/2, push the PUSH STD button to set BARO value to Standard (STD) pressure (29.92 in/Hg). Record the indicated altitude readout on PFD 1/2 in Table 502.

(3) Slowly adjust pitot/static test set for 1,000 feet.

(4) Using the BARO knob on the DCP 1/2, set the barometric pressure scale to each of the pressures listed in Table 502. Record the indicated altitude readout on PFD 1/2 and make sure that it is within the specified tolerance range of Table 502.

Table 502
Barometric Scale Error Test

Pressure (inches of Hg	Altitude Difference (feet)	Altitude Tolerance (feet)	ADC 1 Altitude (feet)	ADC 2 Altitude (feet)
28.10	-1,727	± 21		
28.50	-1,340	± 21		
29.00	-863	± 21		
29.50	-392	± 21		
29.92	0	± 21		
30.50	+531	± 21		
30.90	+893	± 21		
30.99	+974	± 21		

E. ADC 1/2, Altitude Accuracy Test

CAUTION: *Do not exceed 5,000 fpm climb/descent rates.*

(1) Using the BARO knob on the DCP 1/2, push the PUSH STD button to set BARO value to Standard (STD) pressure (29.92 in/Hg).

(2) Slowly adjust the pitot/static test set to the first test point in Table 503. Record the indicated altitude readout on PFD 1/2 and make sure it is within the specified tolerance range of Table 503.

(3) Repeat paragraph 3.E. (2) for the remaining test points in Table 503.

Table 503
ADC 1/2 Altitude Accuracy Test

Altitude Test Point (feet)	Altitude Tolerance (feet)	ADC 1 Altitude (feet)	ADC 2 Altitude (feet)
-1,000	± 20		
0	± 20		
1,000	± 20		
2,000	± 21		
3,000	± 21		
4,000	± 22		
5,000	± 22		
8,000	± 24		
10,000	± 25		
14,000	± 29		
17,000	± 32		
20,000	± 35		
29,000	± 40		
33,000	± 40		
35,000	± 40		
37,000	± 40		
39,000	± 40		
41,000	± 40		
45,000	± 65		

NOTE: Altitude ± tolerance does not include pitot/static test set error tolerance.

F. ADC 1/2, Vertical Speed Accuracy Test

CAUTION: *Do not exceed 5,000 fpm climb/descent rates.*

(1) Slowly adjust pitot/static test set Pressure Bleed valve to establish the first vertical descent test point in Table 504. Record the indicated vertical speed descent rate and make sure it is within the specified tolerance range of Table 504.

(2) Repeat paragraph 3.F. (1) for the remaining vertical descent test point in Table 504.

(3) Close the pitot/static test set Pressure Bleed valve and slowly open the pitot/static test set Suction Rate valve to establish the first vertical climb rate in Table 504. Record the indicated vertical speed climb rate and make sure it is within the specified tolerance range of Table 504.

(4) Repeat paragraph 3.F. (3) for the remaining vertical climb test point in Table 504.

Table 504
ADC 1/2 Vertical Speed Accuracy Test

Vertical Speed (fpm)	Vertical Speed Tolerance (fpm)	ADC 1 Vertical Speed	ADC 2 Vertical Speed
-4000	± 200		
-1000	± 50		
1000	± 50		
4000	± 200		

NOTE: Vspeed ± tolerance does not include pitot/static test set error tolerance.

(5) Slowly adjust the pitot/static test set back to Field Elevation

G. Close Up

(1) De-energize the airplane 28 Vd.c. busbars and disconnect the external 28 Vd.c. power.

(2) Disconnect the adapters and bungs from the pitot/static test set and the airplane ports and install airplane covers.

(3) Make sure that the work area is clean and clear of tools and other equipment.

NAVIGATION
FLIGHT ENVIRONMENT DATA
PITOT/STATIC SYSTEM
DESCRIPTION

1. INFORMATION

The system supplies pitot/static information to the No.1 and No.2 air data computers (ADC).

The ADCs transmit the information electrically to:

- The electronic flight instrument system (EFIS) (Ref. 34-60-35, 001).
- The integrated avionics processor system (IAPS) (Ref. 31-40-15, 001).
- The landing gear warning system (Ref. 32-60-00, 001).

Provision is made at the computers for the connection of various additional special order equipment.

Apart from the pitot/static supplies to the ADC's, direct supplies are also piped to the electronic standby instrument system (ESIS) (Ref. 31-20-66, 001) air data unit, the cabin differential pressure gauge and (for Airplanes Pre-Mod.25G206A or B or without Kit 149-3444) a stall detector. Connections are also provided for additional equipment.

Pitot and static pressures are provided by two pitot heads and four static vent plates respectively.

For Airplanes Pre-Mod.25G206A or B or without Kit 149-3444:

Two wing vents provide stall identification system pressure.

For all Airplanes:

Water drains are provided in the system pipelines.

2. DESCRIPTION

A. Pitot Heads

The pitot heads, mounted one each side of the fuselage nose, are electrically heated and provide independent pressure supplies to:

Left pitot head (P1)	No.1 air data computer only.
For Airplanes Pre-Mod.25G206A or B or without Kit 149-3444: Right pitot head (P2)(Ref. Figure 1)	No 2 air data computer, third channel stall detector, ESIS air data unit and additional equipment connection.
For Airplanes Mod.25G206A or B or with Kit 149-3444: Right pitot head (P2) (Ref. Figure 2 or Figure 3)	No 2 air data computer, ESIS air data unit and additional equipment connection.

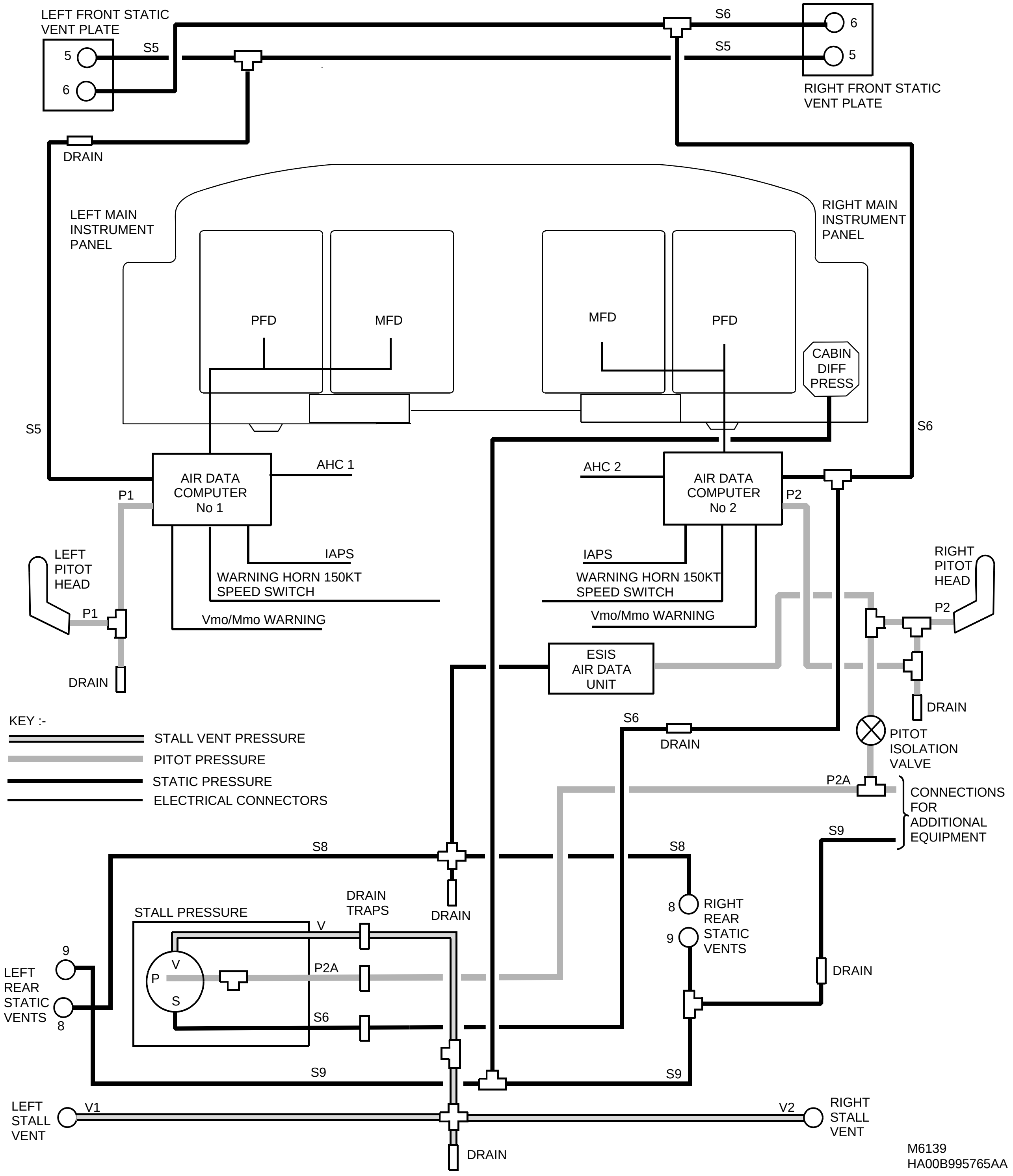


Figure 1
Pitot/Static and Stall Vent Systems - Pre-Mod.25G206A or B or without Kit 149-3444

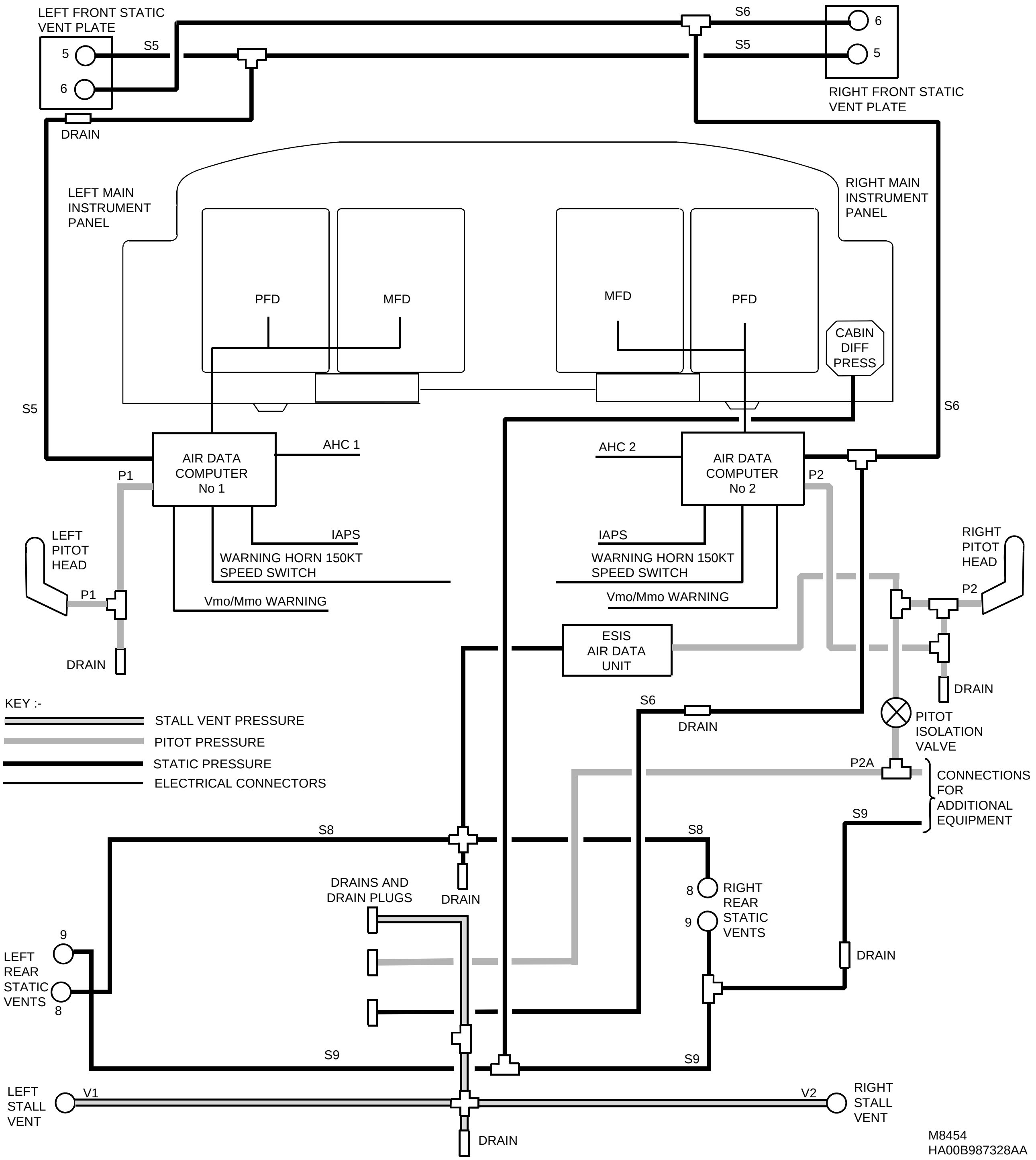


Figure 2
Pitot/Static System - Mod.25G206A or with Kit 149-3444

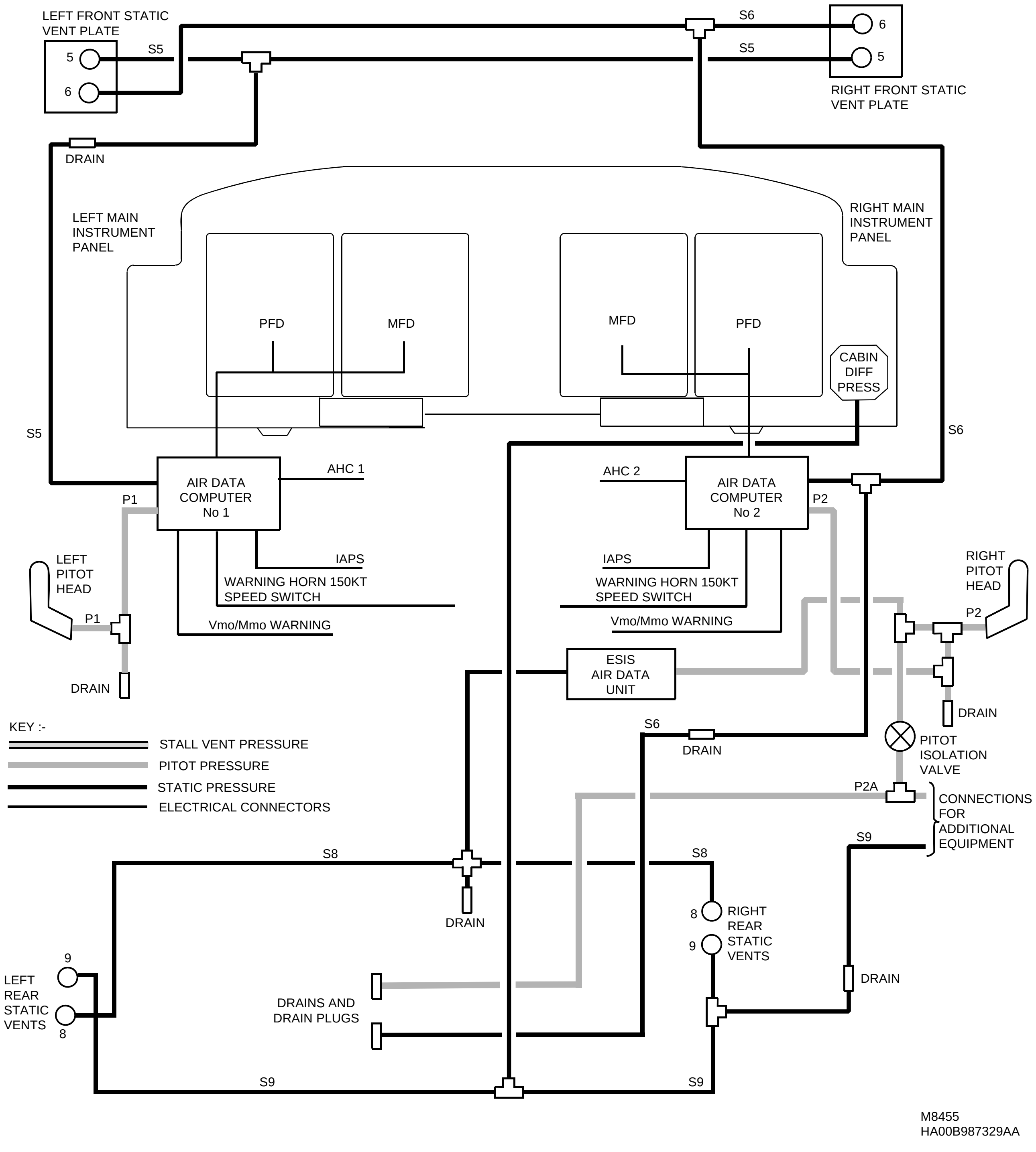


Figure 3
Pitot/Static System - Mod.25G206B

B. Static Vent Plates

Two static vent plates are mounted on each side of the forward fuselage, only the front plates are electrically heated (Ref. 30-35-00, 001). Two static vents are provided in each front plate and two in each rear plate. The vents, numbered for reference, are connected. The four static sources supply:

Static 5	No.1 air data computer only.
For Airplanes Pre-Mod.25G206A or B or without Kit 149-3444: Static 6 (Ref. Figure 1)	No 2 air data computer and third channel stall detector.
For Airplanes Mod.25G206A or B or with Kit 149-3444: Static 6 (Ref. Figure 2 or Figure 3)	No 2 air data computer only.
Static 8	ESIS air data unit.
Static 9	Cabin differential pressure gauge and additional equipment connections.

NOTE: There are no static sources numbered 1, 2, 3, 4, or 7.

C. Additional Equipment

A PITOT ISOLATION valve is located on the right side console, this controls the pitot supply to the connections for additional equipment and (for Airplanes Pre-Mod.25G206 A or B or without Kit 149-3444) the stall detector. Push and turn the control to operate.

D. Stall Vents (Pre-Mod.25G206A or B or without Kit 149-3444)

A stall vent is mounted on the underside of each wing. Each vent is connected by a pipeline, through a water trap and drain, to a three way junction and then through a drain trap to a stall detector.

NOTE: Mod.25G206A or Kit 149-3444 removes the third channel stall detector and disconnects and caps the stall vent piping at the drain plug.

NOTE: Mod.25G206B completely removes the stall detector, the stall vents and related piping from the wings and fuselage.

E. Stall Identification (Pre-Mod.25G206A or B or without Kit 149-3444)

Pitot, static and stall pressures are supplied from the right pitot head, static 6 system and stall vents respectively to a capsule-operated stall detector. When the airplane approaches a stall condition, the detector operates to activate the third channel of the stall identification system.

NAVIGATION
FLIGHT ENVIRONMENT DATA
PITOT/STATIC SYSTEM
SERVICING

1. INFORMATION

CAUTION: *Maximum permissible pressure on static system is 0.5 psi (3.44 kPa). An equal compensating pressure must also be applied to the related pitot head.*

NOTE: For Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444 refer to paragraph 2.

NOTE: For Airplanes Mod.25G206A or B or airplanes with Kit 149-3444 refer to paragraph 3.

Equipment/Material	Part/Item No.
Pitot/Static test set	Druk or equivalent
Pitot head adapter	20293 (ITEM 34-10-02)

2. SYSTEM SERVICING (PRE-MOD.25G206A OR B OR WITHOUT KIT 149-3444)

A. Drain the Pitot/Static and Stall Vent System - Keel

(1) Use the appropriate test equipment to apply a pressure of not more than 0.5 psi (3.44 kPa) to the pitot/static or stall warning systems as necessary (Ref. Figure 301).

(2) Use a suitable receptacle, drain water from each drain valve in turn.

  (a) Drain the water from the drain valves by removing the screw from the drain valve insert. Make sure that the sealing screw and/or the insert is not worn due to Nyloc degradation. Install the screw when all the water has been removed.

(3) Slowly release the pressure and remove the test equipment.

B. Drain the Stall Vent System - Wing/Fuselage Fairing

(1) Use the appropriate test equipment to apply a pressure of not more than 0.5 psi (3.44 kPa) to the stall vent system (Ref. Figure 302).

(2) Open access panel W503 in the wing/fuselage fairing.

(3) At the drain valve assembly, push and hold the valve spindle fully in. When the flow of water has stopped, release the spindle.

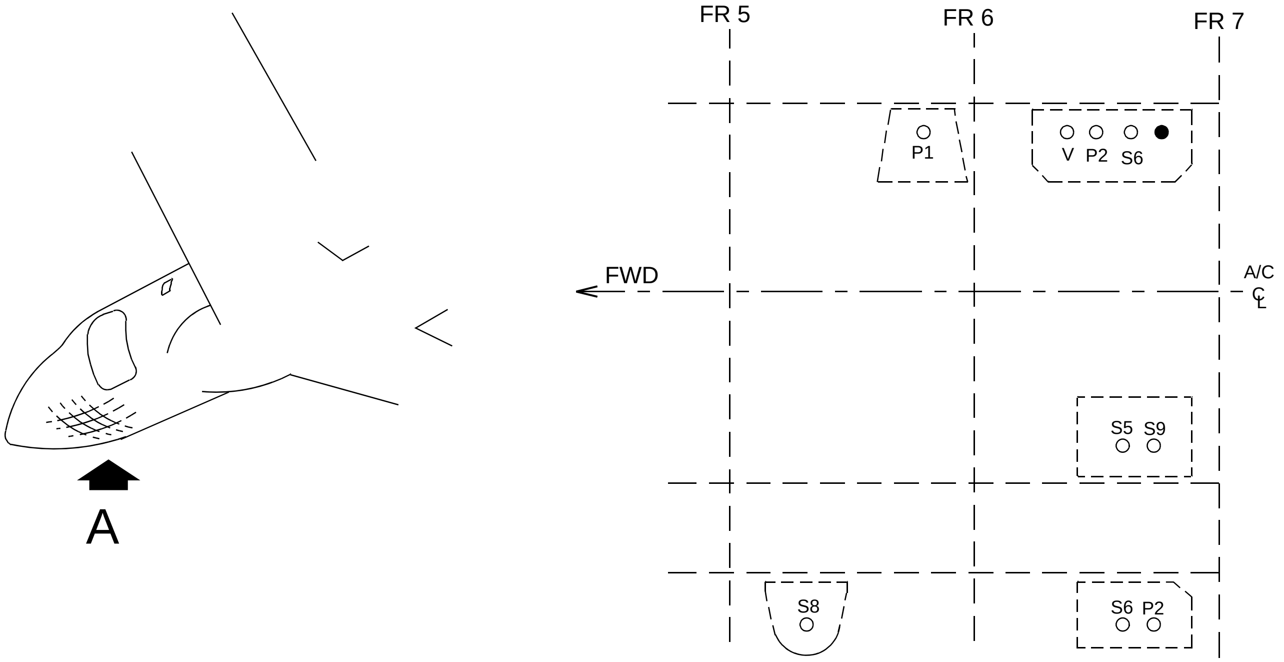
(4) Make sure that the valve seal is fully seated.

(5) Slowly release the pressure and remove the test equipment.

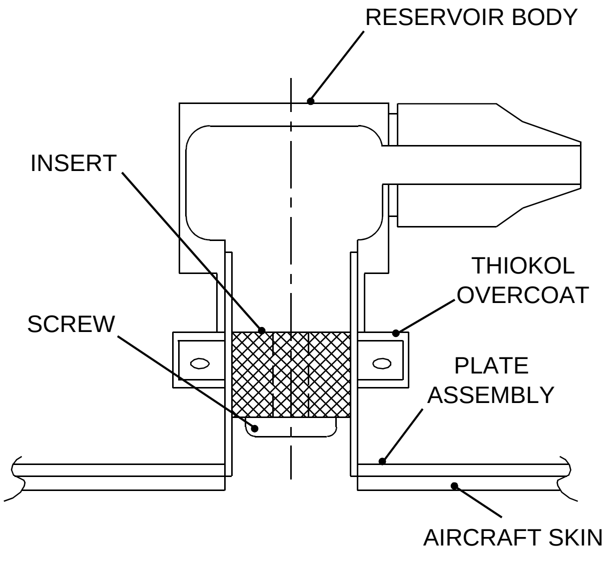
(6) Close access panel W503 in the wing/fuselage fairing.

C. Close Up

(1) Make sure that the work area is clean and clear of tools and other equipment.



VIEW ON A SHOWING TYPICAL PITOT / STATIC DRAIN POINTS IN KEEL



DRAIN VALVE ASSEMBLY

M6140
HA00B995775AA

Figure 301
Pitot/Static and Stall Warning Drains in the Keel (Pre-Mod.25G206A or B or without Kit 149-3444)

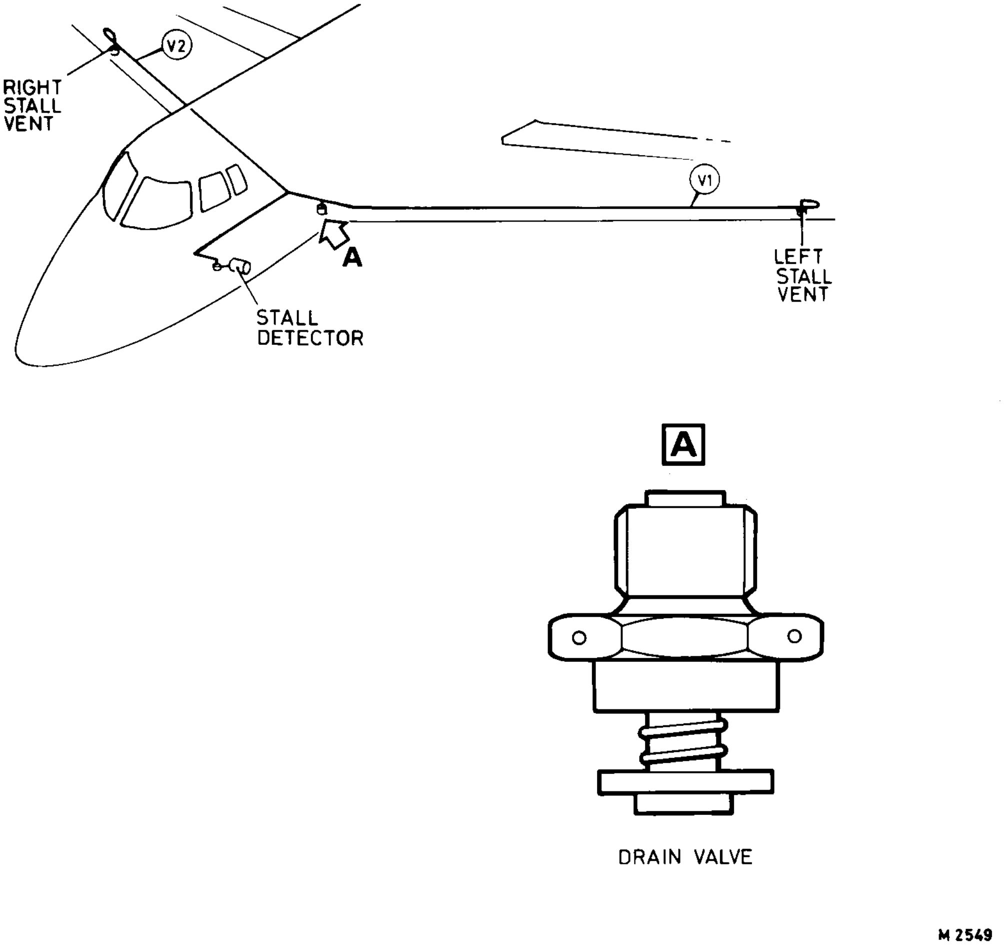


Figure 302
Stall Warning Drain in Wing/Fuselage Fairing (Pre-Mod.25G206A or B or without Kit 149-3444)

3. SYSTEM SERVICING (MOD.25G206A OR B OR WITH KIT 149-3444)

A. Drain the Pitot/Static System - Keel

(1) Use the appropriate test equipment to apply a pressure of not more than 0.5 psi (3.44 kPa) to the pitot/static as necessary (Ref. Figure 303).

(2) Use a suitable receptacle, drain water from each drain valve in turn.

(a) Drain the water from the drain valves by removing the screw from the drain valve insert. Make sure that the sealing screw and/or the insert is not worn due to Nyloc degradation. Install the screw when all the water has been removed.

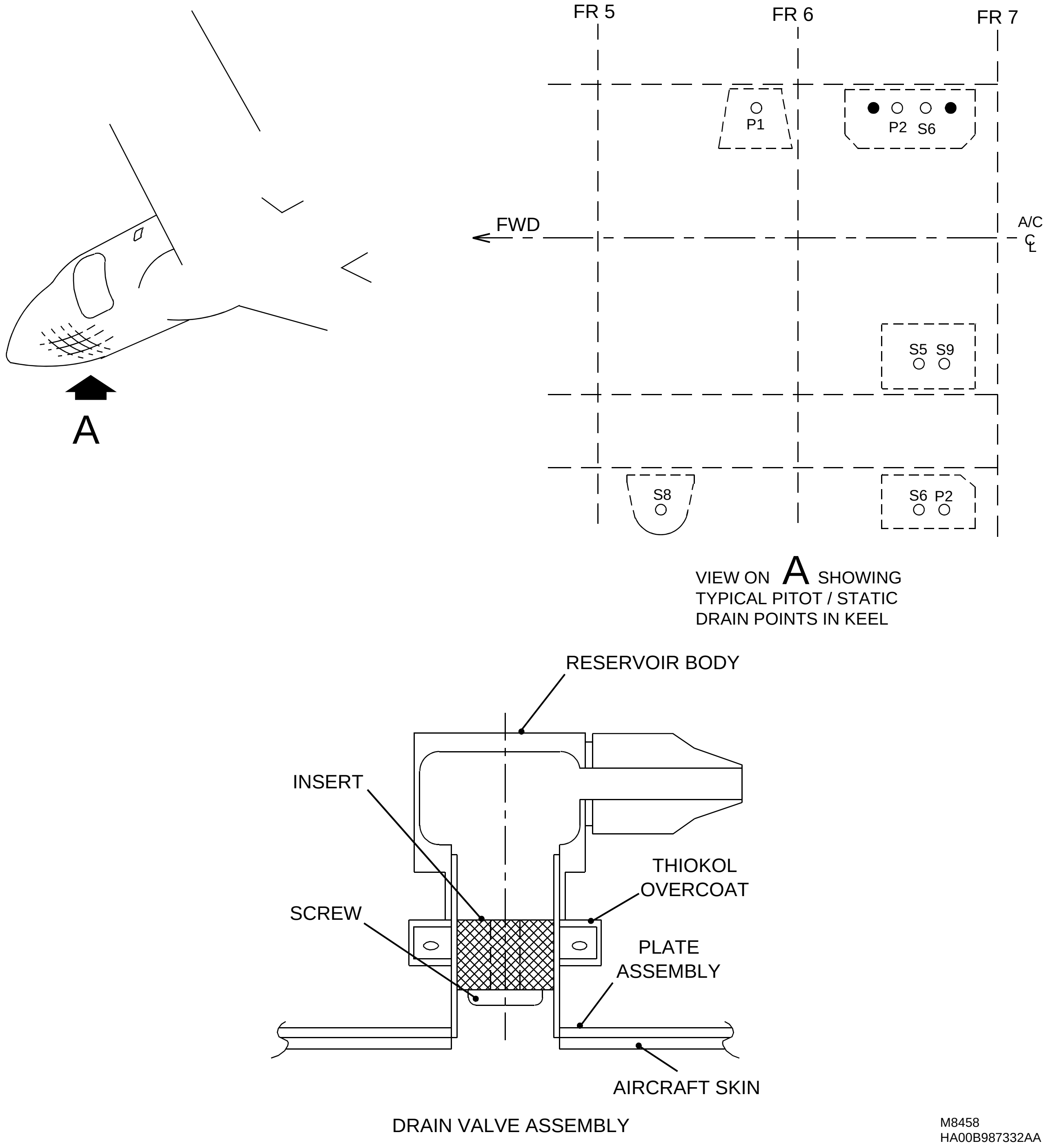


Figure 303
Pitot/Static Drains in the Keel (Mod.25G206A or B or with Kit 149-3444)

(3) Slowly release the pressure and remove the test equipment.

B. Close Up

(1) Make sure that the work area is clean and clear of tools and other equipment.

PITOT/STATIC SYSTEM - REMOVAL/INSTALLATION

1. General

When components or pipelines in the pitot/static system are disconnected, or when the system is in any way suspect, that system must be tested as specified in ADJUSTMENT/TEST paragraph 2.A. and 2.B. ADJUSTMENT/TEST paragraph 2.D. also gives the test necessary under similar circumstances for the stall vent pressure system.

Reference to the PITOT/STATIC SYSTEM - DESCRIPTION AND OPERATION, and the relevant Chapter 34, NAVIGATION and/or the Customer Supplement Topic will indicate the system or systems to be tested due to component removal. Where more than a single disconnection is made, other than disconnection at components, that system must be tested as specified in ADJUSTMENT/TEST, paragraph 2.E.

2. Pitot/Static Pipe

A. Removal

(1) Disconnect the joints at each end of the pipe.

(2) Remove and retain any P-clips which secure the pipe to the airframe.

(3) Remove and retain the pipe.

(4) Install blanks to the exposed ends of the pipe to prevent contamination.

B. Installation

Equipment/Material	Part/Item No.
Wire, corrosion resistant	651 (Chapter 20-95-601)

CAUTION: WHEN YOU CONNECT A PIPE TO A HOSE, MAKE SURE THAT THE HOSE DOES NOT TWIST WHEN THE UNION NUT IS TIGHTENED.

CAUTION: TO PREVENT DAMAGE WHEN YOU CONNECT A PIPE TO A COMPONENT, HOLD THE COMPONENT'S PIPE ADAPTERS WITH A WRENCH WHEN YOU TIGHTEN THE UNION NUT.

CAUTION: MAKE SURE THAT A NATURAL FALL OF THE PIPELINES IS MAINTAINED. DO NOT LET THE PIPELINES BEND OR SAG BETWEEN THE CLAMPS OR CLIPS. THIS IS TO MAKE SURE THE SYSTEM DRAINS CORRECTLY.

(1) Before you install a pipe, blow through the pipe with clean air to make sure that the pipe is clean and free from obstructions.

(2) Make sure that the bell ends of the pipe and their mating adapters are clean and not damaged.

(3) Put the pipe in position, connect and tighten the unions at each end. Safety the unions with lockwire (Item 651).

(4) Put the P-clips in their original positions and attach the P-clips to secure the pipe to the airframe.

NOTE: *Make sure the pipe cannot chafe against other pipelines, the airframe structure or any installed equipment.*

(5) After installation do a pressure test of the related pipeline system.

C. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous items of equipment.Lockwire any disturbed joints.

NAVIGATION
FLIGHT ENVIRONMENT DATA
PITOT/STATIC SYSTEM
ADJUSTMENT/TEST

1. INFORMATION

When components or pipelines in the pitot system are disconnected, or when the system is in any way suspect, the system must be tested as specified in paragraph 2.A.

Similarly, a static system so disturbed or suspect, must be tested as specified in paragraph 2.B.

For Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444:
Paragraph 2.D. gives the test required under similar circumstances for the stall vent pressure system.

For all Airplanes:
Reference to 34-11-19, 1, the related 34-00-00, TOC and/or the Customer Supplement Topic will indicate the system or systems to be tested due to component removal. Where more than a single disconnection is made, other than disconnection at components, that system must be tested as specified in paragraph 2.E.

Equipment/Materials	Part/Item No.
Leak testing solution: 5% solution in distilled water	604 (Ref. AMM 125/H-20, 20-95-601)
Distilled water	Local supply
Pitot/static test set (2 off)	Druk or equivalent
Adapter - Pressure Head	20293 (ITEM 34-10-02)
For Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444: Adapter(s) - Expanding Stall Vent	WIDS 107G (ITEM 34-10-01)
Adapter(s) - Expanding	25YTS129R21A (ITEM 34-10-03), or equivalent, Ref. components found in Nav-Aids Kit ADA125-612, or Nav-Aids Kit ADA125-945
Blank(s) - Expanding	25YTS129R23A (ITEM 34-10-04), or equivalent, Ref. components found in Nav-Aids Kit ADA125-612, or Nav-Aids Kit ADA125-945
Wire, corrosion resistant	651 (Ref. AMM 125/H-20, 20-95-601)
U-connections	TS116R-5
U-connections	TS116R-3
Caps suitable for instrument adapters	Local supply
Stopwatch	Local supply

2. ADJUSTMENT/TEST

CAUTION: *When components have been installed or replaced in a system, make sure that the system operates in the correct sense.*

CAUTION: *Do not apply side loads to pitot heads.*

A. Pressure Test Complete Pitot System

NOTE: Conversion readings: 350 knots, 2173 mm WG, 214 mb, 3.10 psi or 6.30 in.Hg.

(1) On roof panel CG, make sure that the PITOT/VANE HEAT L and R switches are set to OFF.

(2) Energize the 28 Vd.c. busbars (Ref. 24-01-00, 201, Figure 201).

(3) Make sure that the relevant circuit breakers are closed as follows:

Panel	Label
DA-A	ADC1 PRI
DA-A	ADC2 PRI
DA-A	ADC1 SEC
DA-A	ADC2 SEC
DA-A	ESIS ADU

The right pitot system:

(4) Make sure that the PITOT ISOLATION valve control on the right console is in the NORMAL (open) position.

(5) Make sure that both pipeline (P2) water drain valves are free of water and, the sealing screws are fully tightened (Ref. 34-11-19, 301).

(6) Make sure that the drain holes in the pitot head are clear.

(7) Install the pitot head adapter to the right pitot head. Make sure that the clamp is correctly installed to cover the pitot head drain holes.

(8) Connect the test set pressure hose to the adapter.

(9) Slowly raise the test pressure to 350 ± 2 knots.

(10) Make sure that the test pressure is maintained for 5 minutes.

NOTE: A pressure leak rate tolerance of less than 1 knot in 5 minutes is permitted.

(11) If the pressure leak rate is more than 1 knot within the 5 minute period:

(a) Test all joints and drain valves with the leak test solution (Item 604).

(b) Repair all faulty connections and do the test again until satisfactory, lockwire (Item 651) the unions.

(c) Remove all traces of solution with distilled water, and thoroughly dry.

(12) Slowly release air pressure from the system.

(13) Test the serviceability of the PITOT ISOLATION valve as follows:

(a) Turn the PITOT ISOLATION valve control, on right console, to its ISOLATE (closed) position.

(b) Do paragraphs 2.A. (9) and (10) again.

(c) No drop in pressure over the time period shows that the PITOT ISOLATION valve is serviceable, provided that during paragraph (9) the valve does not leak enough to pressurize the isolated part of the system.

(d) To make sure that this is not so, move the PITOT ISOLATION valve control very slowly to its NORMAL (open) position. Look for any associated drop in pressure on the test set indicator as air pressure escapes into the unpressurized (isolated) part of the system.

(14) Slowly release the air pressure from the system.

(15) Disconnect the test set from the pitot head adapter, and remove the adapter from the pitot head.

The left pitot system:

(16) Make sure that the pipeline (P1) water drain valve is free of water and, the sealing screw is fully tightened (Ref. 34-11-19, 301).

(17) Do paragraphs 2.A. (6) thru (12) inclusive and paragraph 2.A. (15) for the left pitot system.

(18) De-energize the busbars.

B. Suction Test Complete Static System

CAUTION: *To prevent damage to computers or instruments, all of them must be electrically energized before the application of test pressures (Ref. paragraph 2.A.(1) thru (3)).*

CAUTION: *Make sure that pitot heat is selected off when power is applied to the airplane and that it remains off for the duration of the test.*

CAUTION: *Application and release of test pressures must be done slowly.*

CAUTION: *Components of the pitot static system may be severely damaged if the affected systems shown in Table 501 are not equalized to the pressure applied to the system under test.*

Table 501
Pitot/Static Systems

System under test	Affects these systems
P1	S5

Table 501
Pitot/Static Systems (Continued)

System under test	Affects these systems
P2	S6 For Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444: V1/V2
S5	P1
S6	P2 For Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444: V1/V2
S8	P2
S9	Optional equipment and cabin pressure indicator

NOTE: An example is, if a leak is suspected in the P2 system, apply equal pressure to P2, S6, and the wing vents V1/V2 (Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444) to troubleshoot the system.

NOTE: Conversion readings: 555 knots, 6011 mm WG, 591 mb, 8.55 psi or 17.45 in.Hg.

(1) Make sure that the pipelines are drained of water and the sealing screw is fully tightened (Ref. 34-11-19, 301).

(2) Install expanding plug blanks in the static vents of the systems under test on the right static vent plates.

(3) Install expanding plug adapters in the static vents of the systems under test on the left static vent plates.

(4) For Airplanes Pre-Mod.25G206 A or B or airplanes without Kit 149-3444:
Install the expanding blank (right) and adapter (left) in the stall vents.

(5) Connect the pitot/static test set to the expanding plug adapters.

(6) Attach the pitot head adapter to the related pitot head of the static system under test, make sure that the clamp is correctly installed to cover the drain.

(7) Whilst the test suction is applied to the static system:

  (a) For Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444:
  A simultaneous suction is applied to the related pitot system and/or the stall vents in accordance with the CAUTIONS at the start of this procedure.

  (b) For Airplanes Mod.25G206A or B or airplanes with Kit 149-3444:
  A simultaneous suction is applied to the related pitot system in accordance with the CAUTIONS at the start of this procedure.

(8) Set the Pilot's and Co-pilot's PFD Baro pressure readings to 29.92 in/Hg (1013.207 mB) and make a record of the altitude.

(9) Slowly apply test suction as required to maintain a +4000 ft/min climb rate on the Pilot's PFD Vertical Speed Indication.

(10) The Pilot's vertical speed pointer should move smoothly to +4000 ft/min.

(11) The Pilot's altitude indication should show a steady increase in altitude.

(12) The Pilot's airspeed/mach indication should read zero.

(13) The Co-pilot's altitude indication should read the altitude as recorded in paragraph 2.B. (8) and remain steady.

(14) Close the suction valve when the Pilot's altimeter indicates 24,000 ± 100 ft above the pressure altitude recorded in paragraph 2.B. (8). Use a stopwatch to observe the indication for one minute.

(15) The Pilot's altimeter indication is not to decrease by more than 280 ft during a period of one minute after the valve is closed. If a leak is detected go to paragraph 2.B. (26).

(16) The Pilot's vertical speed pointer shall indicate 0 or a slight descent but no more than 280 ft/min.

(17) The cabin altitude/differential pressure indicator pointer will fall into the range between 8.5 psig graduation and the red arc. It must not go beyond the red arc.

NOTE: If the S9 system is not evacuated during this test, there will be no change in the differential pressure during the procedure.

(18) Slowly open the suction valve and adjust as required to maintain -4000 ft/min Pilot's vertical speed pointer descent rate.

(19) The Pilot's vertical speed pointer moves smoothly to -4000 ft/min.

(20) The Pilot's altitude indication shows a steady decrease in altitude.

(21) When all suction has been released from the static system and the Pilot's altitude indication is stabilized, open the suction valve fully and note the altitude indicated on the Pilot's PFD.

(22) The Pilot's altitude indication is to read within ± 30 ft. of the altitude recorded in paragraph 2.B. (8).

(23) Disconnect the test set from the Pilot's pitot/static systems.

(24) Connect the test set to the Co-pilot's systems.

(25) Do again paragraph 2.B. (5) thru (21) for the Co-pilot's systems.

(26) If a leak is detected:

(a) Slowly release the suction. Apply no more than 0.5 psi or 3.44 kPa of air pressure (Ref. paragraph 2.C.) and use leak test solution (Item 604) to identify leaking joints at components or adapters. Repair faulty joints and lockwire (Item 651).

(b) Do another test of the system to make sure that the leaks have been rectified and continue with the original test. Take care when releasing the positive pressure and when reapplying the suction on the system.

(c) Remove all traces of leak test solution with distilled water, and thoroughly dry the affected areas.

(27) Switch off the navigational equipment and de-energize the d.c. busbars.

(28) Disconnect and remove the adapters and blanks from the pitot/static and stall vent systems (Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444).

C. Static Systems - Leak Detection

CAUTION: *To prevent damage to computers or instruments, all of them must be electrically energized before the application of test pressures (Ref. paragraph 2.A.(1) thru (3)).*

CAUTION: *When detecting leaks in the No.5 static system, 0.5 psi positive pressure must also be applied to the left pitot head.*

CAUTION: *When detecting leaks in the No.6 static system, 0.5 psi positive pressure must also be applied to the right pitot head, No.8 static system, No.9 (if additional equipment is connected to P2) static system and stall vent system (Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444).*

(1) To detect leaks in suction lines, it is permissible to apply a positive pressure of not more than 0.5 psi (3.44 kPa) maximum to pipelines when a leak test solution is used.

(2) All traces of leak test solution must be removed using distilled water and the parts thoroughly dried after tests are complete.

D. Pressure Test Stall Vent System

NOTE: The stall vent system test is only applicable to Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444.

NOTE: Conversion readings: 350 knots, 2173 mm WG, 214 mb, 3.10 psi or 6.30 in.Hg.

NOTE: One pitot/static test set can be used if P2 and V systems are coupled together.

(1) On panel DA-D open, safety clip and tag the relevant circuit breakers:

Panel	Label
DA-D	PITOT HEAT LH
DA-D	PITOT HEAT RH
DA-D	STALL IDENT 3

(2) Make sure that the PITOT ISOLATION valve, on the right console, is in the NORMAL (open) position.

(3) Make sure that both P2 pipeline water drain valves are free from water and the sealing screw is fully tightened (Ref. 34-11-19, 301).

(4) Make sure that both stall vent water traps (V1 and V2) are free from water and the drain valves are correctly seated (Ref. 34-11-19, 301).

(5) Install the pitot head adapter to the right pitot head. Make sure that the clamp is correctly installed to cover the pitot head drain holes.

(6) Connect the test set No.1 to the pitot head adapter.

(7) Install an expanding plug adapter to one stall vent and install a blank to the other stall vent.

(8) Connect test set No.2 to the stall vent plug adapter.

(9) Simultaneously apply the test pressure slowly to the P2 and V systems until 350 ± 2 knots is registered on the test sets.

(10) Make sure that the test pressures on No.1 and No.2 test sets are maintained for 5 minutes.

NOTE: A pressure leak rate tolerance of less than 1 knot in 5 minutes is permitted.

(11) If the pressure leak rate is more than 1 knot within the 5 minute period:

(a) Do a test of the joints and drain valves with leak test solution (Item 604).

(b) Repair all faulty connections and do the test again until satisfactory, then lockwire (Item 651).

(c) Remove all traces of leak test solution with distilled water, and thoroughly dry.

(12) Simultaneously reduce the test pressure slowly on both test sets.

(13) Disconnect the test equipment and remove the adapters.

(14) Remove the safety clips and tags and close the relevant circuit breakers (Ref. 24-01-00, 201).

E. Pressure Test Pitot/Static Pipelines

NOTE: To make sure that the correct disconnections are made in paragraph (1) of the following test procedure, refer to 34-11-19, 1, and the relevant airplanes 34-00-00, TOC and/or Customer Supplement and note the particular instruments and components coupled to the system(s) under test.

NOTE: Make sure that the PITOT ISOLATION valve is in the NORMAL (open) position.

NOTE: Release the test pressure before repairing any leaking joints and do again any test as necessary to prove rectification.

(1) Make sure that all computers, instruments and components connected to the relevant systems being tested are disconnected and suitable caps installed. For simultaneous testing of related pitot and static pipelines, install U-connections to interconnect the pipes. Install caps where pipe connections are exposed to atmosphere and install blanks to the static vents where necessary.

(2) Connect a clean dry air or nitrogen supply to the open pipe through which the test pressure connection will be made. Removing and installing each cap in turn, blow the system through, make sure that a full airflow comes out through the open pipe end. Install the final cap.

(3) Attach the pitot head adapter to the pitot head or the expanding plug adapter to the static or stall vent (Airplanes Pre-Mod.25G206A or B or airplanes without Kit 149-3444), as required. Where the pressure test set is connected to a pitot head, make sure that the pitot head drain holes are completely and effectively covered by the clamp.

(4) Make sure that the system pipelines water drain valves are free of water the sealing screws are fully tightened.

(5) Connect the test set pressure line to the relevant adapter. Slowly increase the test pressure to 10 psi, and close the test set pressure isolating cock. Make sure that the system pressure is held for 10 minutes.

(6) While the system is pressurized apply leak test solution (Item 604) over the drain valve outlets. Make sure there are no bubbles in the leak test solution throughout the test.

(7) If the test pressure drops:-

  (a) Do a check of the pipeline and hose joints and all capped pipe ends with leak test solution (Item 604).

  (b) Repair any leaks and do the test again until the test requirements are satisfied.

  (c) Remove the leak test solution with distilled water and make sure that the pipelines are thoroughly dry.

(8) Release the test pressure slowly, disconnect and remove the test set.

(9) Connect all disconnected joints, remove the U-connections and connect the instruments.

(10) Make sure that the pipelines are correctly assembled and lockwired (Item 651).

(11) Remove the pitot head adapter or the expanding plug adapter.

(12) Remove the blanking plugs from the static vents.

(13) When all computers, instruments and components are reconnected:

  (a) Do a pressure test of the complete relevant pitot system, as specified in paragraph 2.A.

  (b) Do a suction test of the complete relevant static system, as specified in paragraph 2.B.

F. Close up

(1) Make sure that the work area is clean and clear of tools and other equipment.

NAVIGATION
FLIGHT ENVIRONMENT DATA
PITOT HEAD
REMOVAL/INSTALLATION

1. INFORMATION

CAUTION: *Do not use the pitot head as a handhold, you will cause damage and misalignment.*

Equipment/Material	**Part/Item No.**
Polysulfide Sealant	314 (Ref. AMM, 125/H-20, 20-95-301)
Release agent	223 (Ref. AMM, 125/H-20, 20-95-201)
Wire, corrosion resistant	651 (Ref. AMM, 125/H-20, 20-95-601)

2. PITOT HEAD

A. Removal

	MECH	**INSP**
(1) Open, safety clip and tag the related circuit breaker (Ref. 24-01-00, 201): **Panel** — **Circuit Breakers** DA-D — PITOT HEAT LH DA-D — PITOT HEAT RH		
(2) Remove the left (right) side wall trim panel between frame 4 and frame 5 to get access to the terminal block adjacent to the pitot head.		
(3) Disconnect and remove the electrical cables which connect the pitot head to the terminal block.		
(4) Disconnect the pressure pipe at the coupling, and install blanking caps to the open connections.		
(5) Remove the bolts and washers which attach the pitot head, support the pitot head and apply pressure to the unit from inside the fuselage, this will release the sealant.		
(6) Remove the pitot head.		

B. Installation

	MECH	**INSP**
(1) Examine the pitot head and make sure that there are no cracks, distortion, corrosion or signs of any other deterioration.		
(2) Remove old sealant from the fuselage surfaces.		

		MECH	INSP
(3)	Apply a thin layer of sealing compound (Item 314) to the fuselage landing face (Ref. AMM, 125/H-20, 20-10-447, 201).		
(4)	Apply a thin layer of release agent (Item 223) to the pitot head landing face.		
(5)	Put the pitot head in position and attach with the bolts and washers, tighten the bolts to a torque load of 30 lb in. (3.39 Nm), lock wire (Item 651) the bolts together.		
(6)	Remove any excess sealing compound.		
(7)	Connect the flying leads from the pitot head to terminals on the left (right) terminal block: **Pitot Head** — **Terminal Block** 1 & 3 — 1 2 — 2 4 — 3		
(8)	Remove the blanking caps from the pitot head coupling and pressure pipe connector. Connect the pressure pipe to the coupling.		
(9)	Do a pressure test on the related pitot system (Ref. 34-11-19, 501). Wire lock (Item 651) the pipe connection.		
(10)	Remove the safety clip and tag and close the related circuit breaker opened in paragraph 2.A. (1), (Ref. 24-01-00, 201).		
(11)	Do a functional test on the related pitot heater (Ref. 30-35-15, 501).		
(12)	Install the left (right) side wall trim panel between frames 4 and 5.		

C. Close Up

		MECH	INSP
(1)	Make sure the work area is clean and clear of tools and other equipment.		

PITOT HEAD - ADJUSTMENT/TEST

1. Insulation resistance test (routine)

A. Procedure

(1) On panel DA-D open, safety and tag all the related circuit breakers (Chapter 24, ELECTRICAL POWER):

Panel	Label
DA-D	PITOT HEAT LH
DA-D	PITOT HEAT RH

(2) Remove the applicable side wall trim panel between frame 4 and frame 5 to get access to the terminal block adjacent to the pitot head.

(3) Disconnect the flying leads which connect the pitot head to the terminal block.

(4) Connect together the pitot head flying leads, identified 1 and 2. Use a 500 volt insulation resistance tester and make sure that the insulation resistance between the pitot head body and the connected flying leads is not less than 3 megohms.

(5) Do paragraph (4) again for the leads identified 3 and 4.

(6) Disconnect and remove the insulation resistance tester and separate the pitot head flying leads.

(7) Connect the flying leads from the pitot head to terminals 1, 2 and 3 on the terminal block (REMOVAL/INSTALLATION, paragraph 1.B.(7)).

(8) Close the related pitot head circuit breaker (Chapter 24, ELECTRICAL POWER). Energize the related d.c. busbar and do a function check of the pitot heater (Chapter 30, PITOT/STATIC HEATERS).

(9) Install the applicable side wall trim panel between frame 4 and frame 5.

(10) Set the PITOT HEAT (roof panel) switch OFF. De-energize the related busbar.

B. Insulation resistance test (head suspected defective)

(1) Do paragraph 1.A.(1) to (7).

NOTE: Open the circuit breaker for the pitot head not under test before the PITOT HEAT switch is set to ON.

(2) Close the related pitot head circuit breaker, (Chapter 24, ELECTRICAL POWER). Energize the related d.c. busbar (Chapter 30, PITOT/STATIC HEATERS). Set the related PITOT HEAD switch to ON and let the pitot heat for 5 minutes. Set the PITOT HEAT switch to OFF.

(3) Do paragraphs 1.A.(1) to 1.A.(5) inclusive.

(4) Let the pitot head cool and make sure that the insulation resistance has not dropped below 3 megohms. Do paragraphs 1.A.(6) and 1.A.(7) inclusive.

(5) Close the related pitot head circuit breaker (Chapter 24, ELECTRICAL POWER). Energize the related d.c. busbar and do a function check of the pitot heater (Chapter 30, PITOT/STATIC HEATERS).

(6) Set the PITOT HEAT (roof panel) switch to OFF. De-energize the related busbar.

C. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous items of equipment.

NAVIGATION
FLIGHT ENVIRONMENT DATA
STATIC PLATES AND AIRFRAME INSPECTION/CHECK

1. INFORMATION

NOTE: Paragraph 1., 2. and 3.D., 3.E. and 3.F. apply to all Airplanes.

Paragraph 3.A., 3.B. and 3.C. and Figure 601, Sheet 1 and 2 only apply to Airplanes with Nose Avionics Access Panels installed.

Figure 602, Sheet 1 and 2 only apply to Airplanes without Nose Avionics Access Panels installed.

Equipment/Materials	Part/Item No.
Polysulfide sealant	314 (Ref. AMM 125/H-20, 20-95-301)
Compound, sealing	326 (Ref. AMM 125/H-20, 20-95-301)
Adhesive	374 (Ref. AMM 125/H-20, 20-95-301)
Smoothing sealant	396 or 397 (Ref. AMM 125/H-20, 20-95-301)
Cleaner, solvent	201 (Ref. AMM 125/H-20, 20-95-201)
Lint-free cloth	621 (Ref. AMM 125/H-20, 20-95-601)
Barrier material, waterproof, flexible (MIL-B-121 or equivalent)	Local supply
Masking tape	630 (Ref. AMM 125/H-20, 20-95-601)
White cotton gloves	673 (Ref. AMM 125/H-20, 20-95-601)
Urethane paint (MIL-C-83286 or Sterling U - Series) (Refer to Note on RVSM corner marks)	Local supply
The following items are for Airplanes with Nose Avionics Access Panels installed:	
Polysulfide sealant	313 (Ref. AMM 125/H-20, 20-95-301)
Release agent (Lecithin Mold Release)	3052, (P/N of Crown Industrial Products Co.) or equivalent

NOTE: Select a single color for L-shaped RVSM area corner marks. The color must provide a contrast with the underlying existing paint color.

NOTE: The following maintenance actions may require additional inspection criteria. Refer to the AFMS-800XP, Part 4 (Out of Phase Inspections) for further details.

2. STATIC PLATES (ALL AIRPLANES)

These inspections apply to both Left and Right areas.

A. Static Plate Inspection

(1) Check each static plate to confirm the absence of wear, impact damage, traces of paint on the plate (including the chamfer), and general cleanliness of the plate.

NOTE: Paint is not allowed on the forward chamfered edge of the static plate and is not preferred on the upper, lower or aft edges.

Make sure each static plate conforms within allowable damage criterion (Ref. SRM 125-800, 53-10-14, 101).

The following height check measurement is only required if one or more of these conditions has occurred since the height check was last done:

- The static plate has been removed or replaced.
- The airplane has been repainted.
- A repair has been done that could alter the area being measured.

(2) Make sure that the static plate height relative to the skin meets the criteria that follow (plate height shall be measured at no more than 0.20 in. (5.08 mm) from the edge of the plate) (Ref. Figure 601 (Sheet 2 of 2), View A) or (Ref. Figure 602 (Sheet 2 of 2), View A):

Criteria 1: $\frac{D1 + D2 + D3 + D4}{4}$ = 0.065 to 0.076 in. (1.65 to 1.93 mm)

Criteria 2: D1, D2, D3 and D4 must be equal to or greater than 0.060 in. (1.524 mm).

Criteria 3: The difference between any two of the D1, D2, D3 and D4 must not exceed 0.006 in. (0.152 mm).

Example 1:

D1 = 0.061 in., D2 = 0.063 in., D3 = 0.064 in., D4 = 0.061 in.

Fails Criteria 1 - Average is 0.0623 in.

Meets Criteria 2 - Each dimension is greater than 0.060 in.

Meets Criteria 3 - Greatest difference is 0.003 in.

Static Plate does not meet the installation requirements.

Example 2:

D1 = 0.070 in., D2 = 0.063 in., D3 = 0.064 in., D4 = 0.061 in.

Meets Criteria 1 - Average is 0.0645 in.

Meets Criteria 2 - Each dimension is greater than 0.060 in.

Fails Criteria 3 - Greatest difference is 0.009 in.

Static Plate does not meet the installation requirements.

Make sure that all mounting bolt heads are flush with the static plate using a straight edge at Section ‘C’-‘C’ and at all sections parallel to Section ‘C’-‘C’ as indicated (Ref. Figure 601 (Sheet 2 of 2), View A) or (Ref. Figure 602 (Sheet 2 of 2), View A).

NOTE: If the plate height does not comply with these requirements refer to paragraph 2.B. and 2.C. for removal/installation instructions.

(3) At section ‘C’-‘C’ and all sections parallel to ‘C’-‘C’, check flatness of plate using a slip gage 2.5 in. (63.5 mm.) in length and a feeler gage and confirm the following:

(a) Area ‘X’ has no variations exceeding ± 0.010 in. (0.254 mm).

(b) Each area ‘Y’ has no variation exceeding ± 0.020 in. (0.508 mm).

B. Removal of Static Plates

(1) Make sure the static plate plugs are installed.

(2) Remove both PFD’s to gain access to the rear of the static plate (Ref. 34-60-35, 401).

(3) Remove the electrostatic filter from the bracket assembly by removing the 4 bolts. The filter can remain in position with the electrical harness attached for the duration of this procedure.

(4) Remove the 2 fasteners from the forward end of the filter attachment plate and keep for installation. This will allow movement of the plate to access the upper aft static plate attachment fastener.

(5) Mask off the skin around the static plate to prevent damage to the paint during removal and installation.

(6) Remove the filler from the screw heads.

(7) Disconnect the S5 and S6 static lines on the inboard side of the airplane. Install protective caps on these lines and on the static plate connectors.

(8) Remove the 13 countersunk bolts and nuts securing the static plate. Make sure that the nuts on the inside of the airplane are not dropped.

(9) With a plastic scraper or similar tool, carefully loosen the static plate and carefully remove it from the airplane.

(10) Disconnect the heating element electrical connector from the static plate.

(11) With a plastic scraper carefully remove all the existing polysulfide sealant from the under side of the static plate (if the existing static plate is to be re-installed) and from the airplane skin.

C. Installation of Static Plates

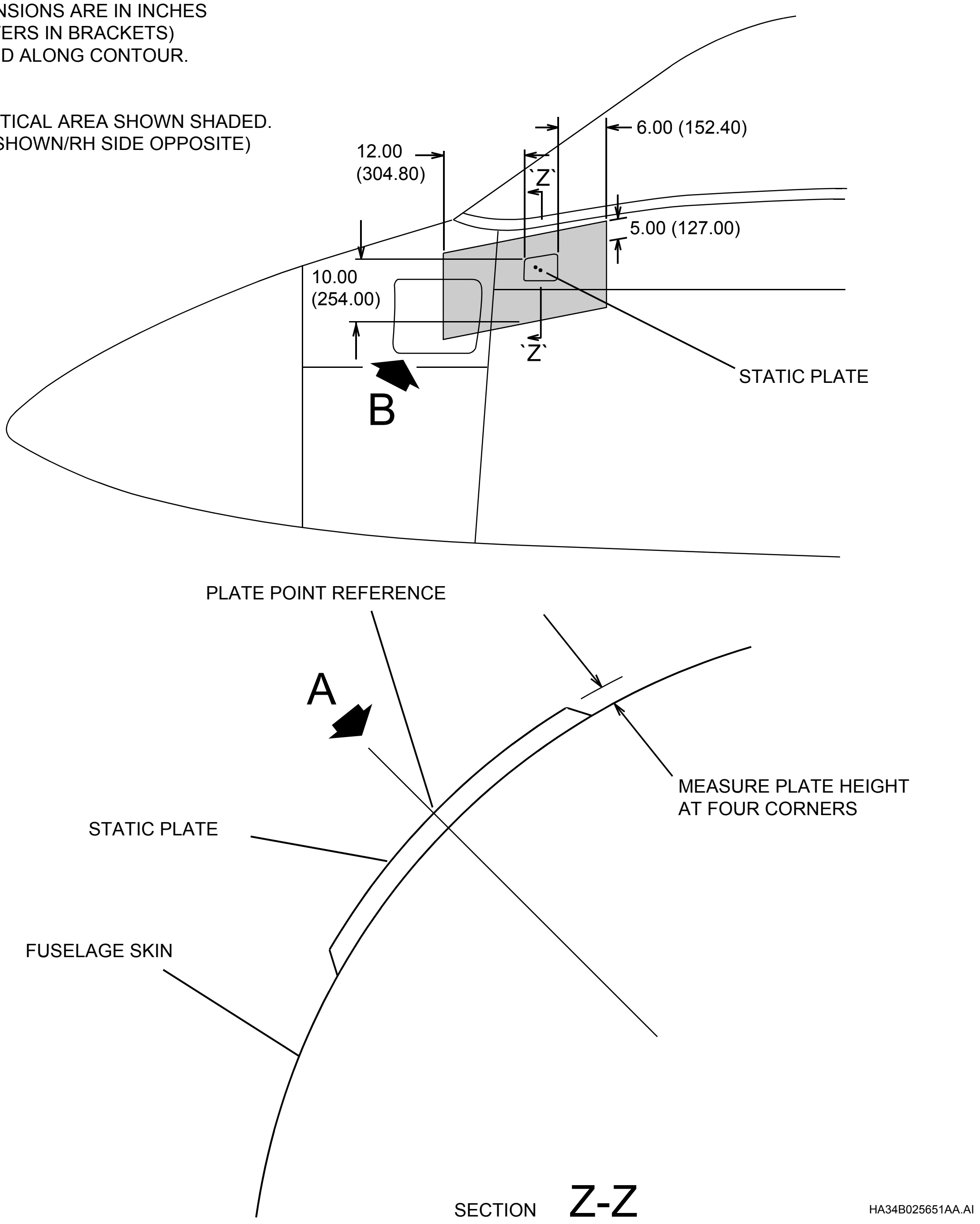
Static Plates Installation - Before Final Paint

Dimensions are measured at the four corner points D1, D2, D3 and D4 and must conform to the requirements that follow:

$$\frac{D1 + D2 + D3 + D4}{4} = \text{0.068 to 0.076 in. (1.73 to 1.93 mm)}$$

D1, D2, D3 and D4 must be equal to or greater than 0.065 in. (1.650 mm).

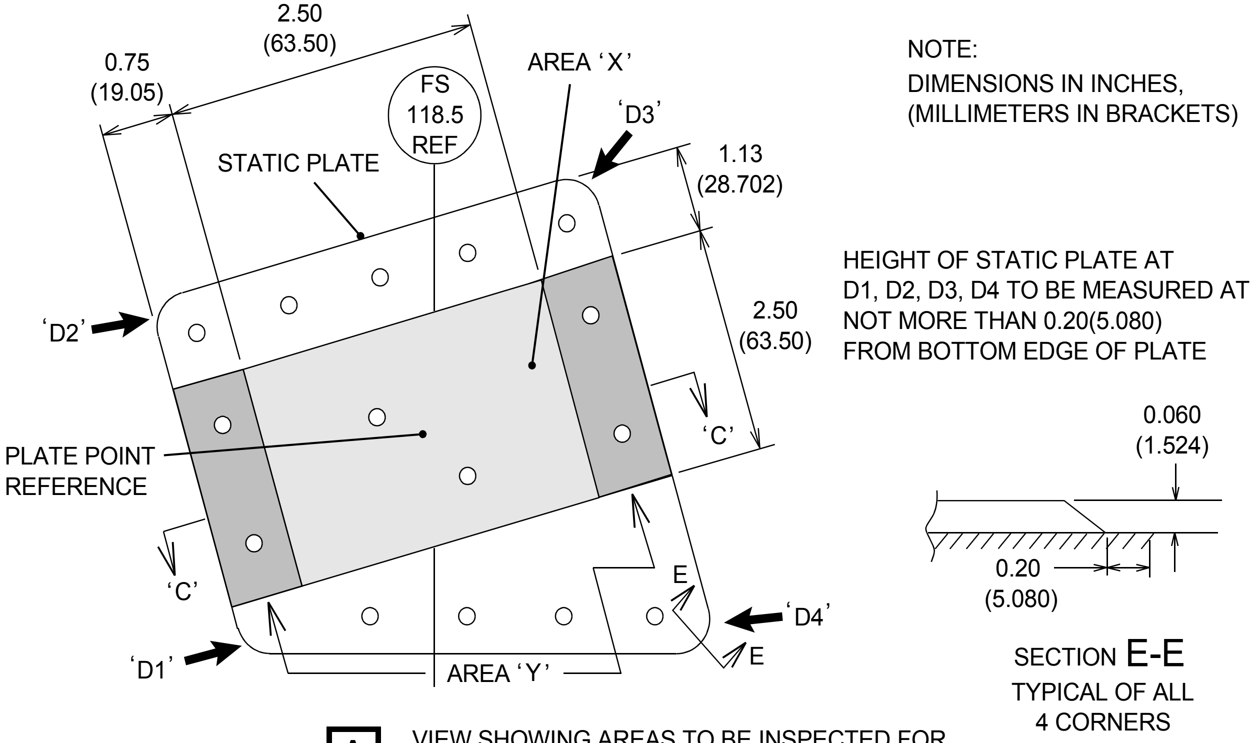
The maximum difference between any two of the D1, D2, D3 and D4 dimensions must not exceed 0.006 in. (0.152 mm).



NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS IN BRACKETS)
MEASURED ALONG CONTOUR.

NOTE:
RVSM CRITICAL AREA SHOWN SHADED.
(LH SIDE SHOWN/RH SIDE OPPOSITE)

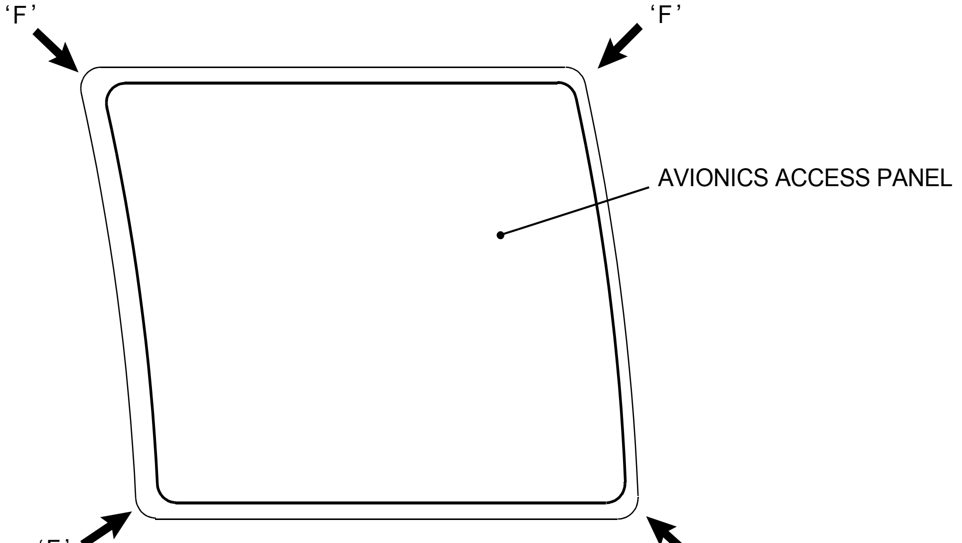
Figure 601 (Sheet 1 of 2)
Inspection of Static Plates, Avionics Access Panels and
Surrounding External Airframe



NOTE:
DIMENSIONS IN INCHES,
(MILLIMETERS IN BRACKETS)

HEIGHT OF STATIC PLATE AT
D1, D2, D3, D4 TO BE MEASURED AT
NOT MORE THAN 0.20(5.080)
FROM BOTTOM EDGE OF PLATE

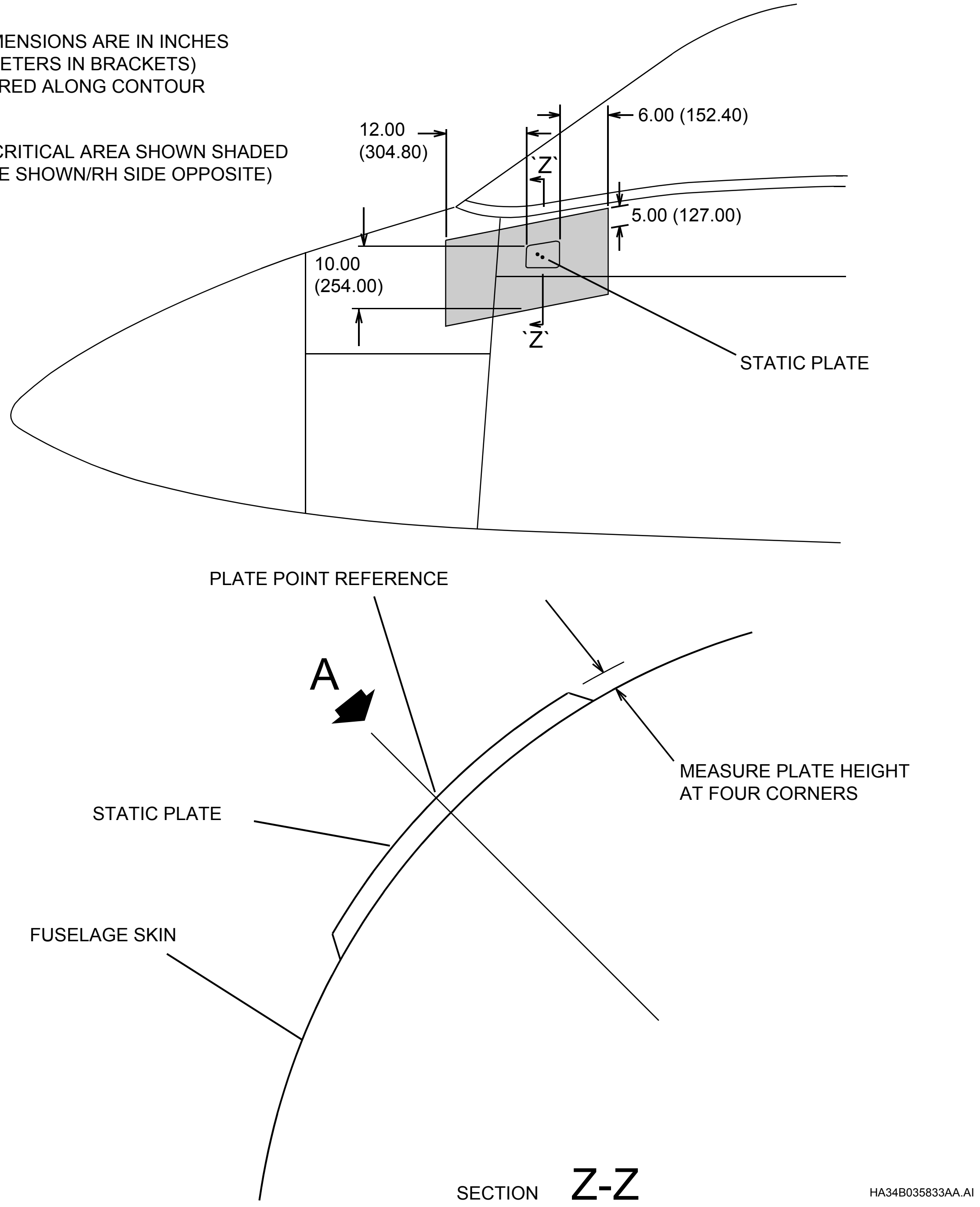
A VIEW SHOWING AREAS TO BE INSPECTED FOR FLATNESS ON THE STATIC PLATE



B VIEW OF INSPECTION AREAS OF NOSE AVIONICS ACCESS PANELS

M3899/4
HA00B989289AA

Figure 601 (Sheet 2 of 2)
Inspection of Static Plates, Avionics Access Panels and Surrounding External Airframe



NOTE:
ALL DIMENSIONS ARE IN INCHES
(MILLIMETERS IN BRACKETS)
MEASURED ALONG CONTOUR

NOTE:
RVSM CRITICAL AREA SHOWN SHADED
(LH SIDE SHOWN/RH SIDE OPPOSITE)

Figure 602 (Sheet 1 of 2)
Inspection of Static Plates and Surrounding External Airframe

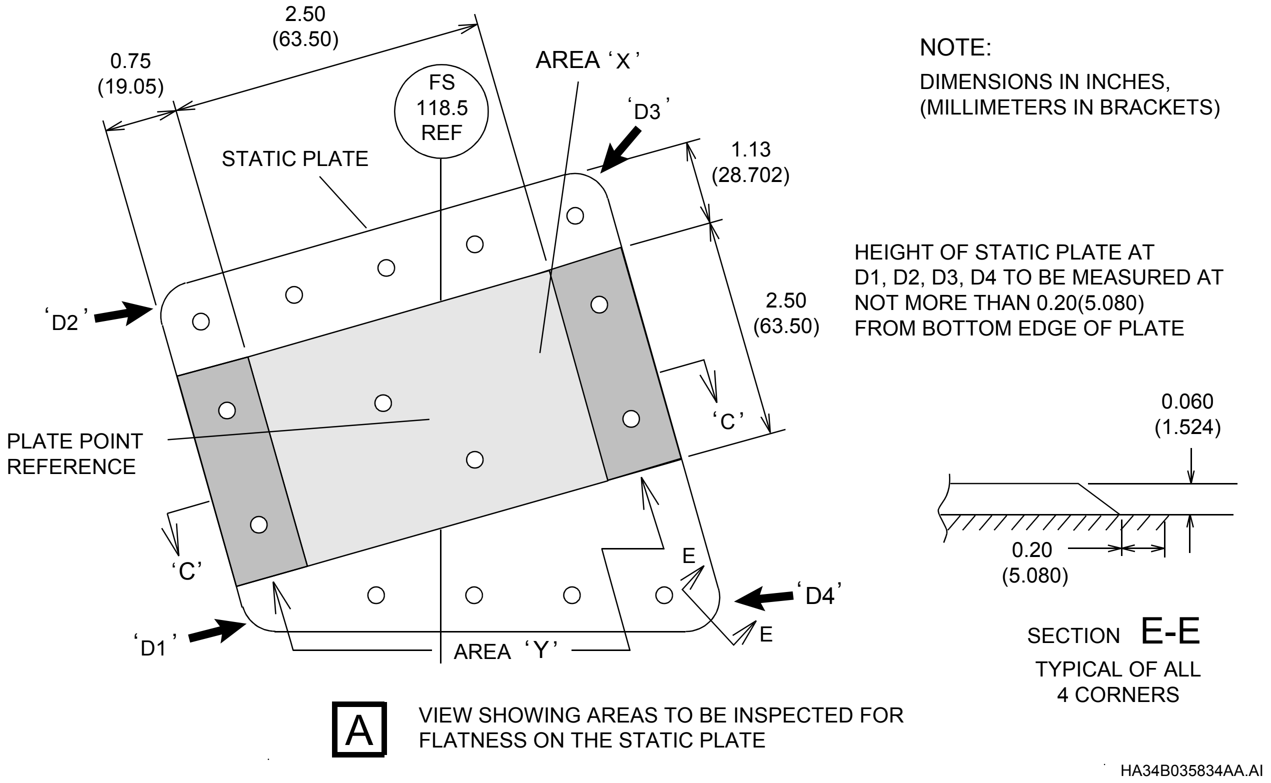


Figure 602 (Sheet 2 of 2)
Inspection of Static Plates and Surrounding External Airframe

Static Plates Installation - After Final Paint

Dimensions are measured at the four corner points D1, D2, D3 and D4 and must conform to the requirements that follow:

$$\frac{D1 + D2 + D3 + D4}{4} = 0.065 \text{ to } 0.076 \text{ in. } (1.65 \text{ to } 1.93 \text{ mm})$$

D1, D2, D3 and D4 must be equal to or greater than 0.060 in. (1.524 mm).

The maximum difference between any two of the D1, D2, D3 and D4 dimensions must not exceed 0.006 in. (0.152 mm).

(1) Apply a bedding seal of polysulfide sealant (Item 314) to the airplane skin in the area of the static plate.

(2) Install the heating element electrical connector to the static plate.

(3) Install the static plate on the airplane using the 13 bolts and nuts retained at paragraph 2.B.(8). Apply sealant (Item 314) under the bolt head and thread locking adhesive (Item 374) to the threads. Tighten the nuts until the head of the fasteners are flush and the static plate meets the installation requirements defined in paragraph 2.A.(2).

(4) Remove excess sealant from around the edge of the static plate and at each screw head. Allow time for the sealant to cure. Fill the slot in each screw head with filler (Item 326).

(5) Connect the static lines disconnected at paragraph 2.B.(7), make sure the correct sense is maintained.

(6) Do system checks of the pitot-static system (Ref. 34-11-19, 501).

(7) Do a functional check of the pitot-static heat system (Ref. 30-35-15, 501).

(8) Install the filter attachment plate with the two fasteners (removed at paragraph 2.B.(4)).

(9) Install the electrostatic filter (removed at paragraph 2.B.(3)).

(10) Install both PFD’s (Ref. 34-60-35, 401).

(11) Do a functional test of the PFD’s (Ref. 34-60-35, 501).

3. AIRFRAME INSPECTION

A. Nose Avionics Access Panels (If Installed)

(1) Accomplish nose avionics panel inspection as follows (Ref. Figure 601 (Sheet 1 of 2), View B).

WARNING: If the sealant requires trimming, care must be taken to not score or otherwise damage the surrounding surface.

(2) Confirm that the panel is not recessed below the surrounding skin and that sealant beads protruding from the panel/skin junction are made flush by removing them with a sharp edge.

(3) Inspect points ‘F’ (four places) (Ref. Figure 601 (Sheet 2 of 2)) to confirm the height difference between the access panel and the surrounding skin does not exceed 0.035 in. (0.89 mm) and the measurements vary by no more than 0.01 in. (0.25 mm).

NOTE: As the airplane is RVSM capable and is to be operated in RVSM airspace, it is recommended the avionics access panels are internally marked with a locally manufactured placard to refer maintenance personnel to the applicable RVSM Service Bulletin (SB 34-3110 initial issue or subsequent) any time the panels are removed and installed.

NOTE: The removed avionics panel(s) should be identified and installed on the same side. Make sure the panel(s) is not distorted during removal or installation.

WARNING: If ripples, creases or other marks that may indicate an anomaly in the panel surface are found, the panel must be replaced.

(4) If the above inspections (paragraphs (1) thru (3) inclusive) are satisfactory, no further action is required. If any of the above inspections are not satisfactory, the panel sealing compound is to be removed and replaced as follows.

B. Remove the Nose Avionics Access Panel (If Installed)

(1) Remove the 16 fasteners and carefully lift the access panel from the airframe. Do not stretch the bonding strap.

(2) Disconnect the bonding strap from the access panel and remove the panel. Make sure the panel is correctly identified for installation.

(3) Carefully remove the temporary sealant (Item 313) from the surface of the existing lower seal (Item 314).

C. Install the Nose Avionics Access Panel (If Installed)

(1) Apply a thin bead of sealant (Item 313) around the perimeter of the mating surface of the fuselage where it contacts with the nose avionics access panels. The sealing compound should be applied over the existing seal (Item 314).

(2) Apply 3052 lecithin mold release or equivalent, to the mating surface of the access panel where it contacts the fuselage.

(3) Connect the bonding lead to the access panel.

(4) Use the existing fasteners to install the access panels onto the fuselage.

(5) Make sure the panel is not recessed below or protruding above the surrounding airplane skin and that any sealing compound protruding from the panel/skin junction is made flush. If any protruding sealing compound has hardened and must be trimmed, make sure the surrounding surface is not scored or damaged.

(6) Allow sufficient time for the sealant (Item 313) to cure.

(7) Examine the access panel in accordance with paragraph 3.A.(1) thru 3.A.(3).

NOTE: Old sealant (Item 313) should be removed and the above procedure followed after each opening of the access panel.

D. RVSM Critical Area Inspection (All Airplanes)

(1) Do a visual inspection of the RVSM critical area. Inspect the skin for any bump, cavity, surface roughness or other damage that alters the profile of the airplane skin. Make sure that there are no paint runs, blisters or lifted paint chips present in this area (Ref. Figure 601 (Sheet 1 of 2) or (Ref. Figure 602 (Sheet 1 of 2)).

NOTE: Paint chips are acceptable provided the edge is not lifted.

(2) Inspect the installation of the vertical skin joint forward of the static plate in the RVSM critical area (Ref. Figure 601 (Sheet 1 of 2)) or (Ref. Figure 602 (Sheet 1 of 2)). Into wind height variation on this joint must not exceed 0.010 in. (0.254 mm) and the out of wind variations must not exceed 0.030 in. (0.762 mm).

(3) If the joint defined in paragraph 3.A.(2) exceeds these dimensions, then the joint must be faired with aerodynamic filler (Item 396 or Item 397) to comply with the dimensional tolerances. Fair the joint at a gradient of approximately 50:1.

NOTE: If the height variation of the skin joint exceeds 0.050 in. (1.270 mm) contact Hawker Beechcraft Corporation Technical Support.

E. RVSM Critical Area Marking

NOTE: Optional RVSM critical area corner marks may be added for ease of identification of the area.

NOTE: The following steps are only required if permanent marking of the RVSM critical area is required.

(1) Identify the left and right critical areas by measuring the area surrounding the static plates on each side of the airplane (Ref. Figure 601 (Sheet 1 of 2)) or (Ref. Figure 602 (Sheet 1 of 2)).

(2) Mask the area surrounding the static plate to protect from solvent splash and paint overspray using barrier material and masking tape (Item 630).

WARNING: Solvents are flammable and hazardous. Avoid contact with skin, eyes and respiratory tract. Skin and eye protection is required. Avoid repeated or prolonged contact. Keep away from flames or sources of heat. Use in a well-ventilated area.

(3) Clean the areas surrounding the static plates with a clean cotton cheese cloth moistened with cleaner solvent (Item 201) or equivalent.

CAUTION: *After the surfaces have been cleaned, avoid contaminating the area with skin oils. Wear clean lint free cotton gloves for subsequent handling.*

(4) Make a template by cutting L-shaped notches in card stock or similar material (Ref. Figure 603). Make the template with cutout notches that measure 2 in. (50.8 mm) high by 2 in. (50.8 mm) wide with 0.5 in. (12.7 mm) thick legs.

NOTE: The upper rear marking is only a vertical stripe.

(5) Fasten the template to the side of the fuselage with masking tape (Item 630) (to identify the RVSM critical areas (Ref. Figure 603)). Apply barrier material attached with masking tape around the spraying area to prevent overspray.

NOTE: Dimensions of markings are suggested. Marking dimensions may be altered to suit operator.

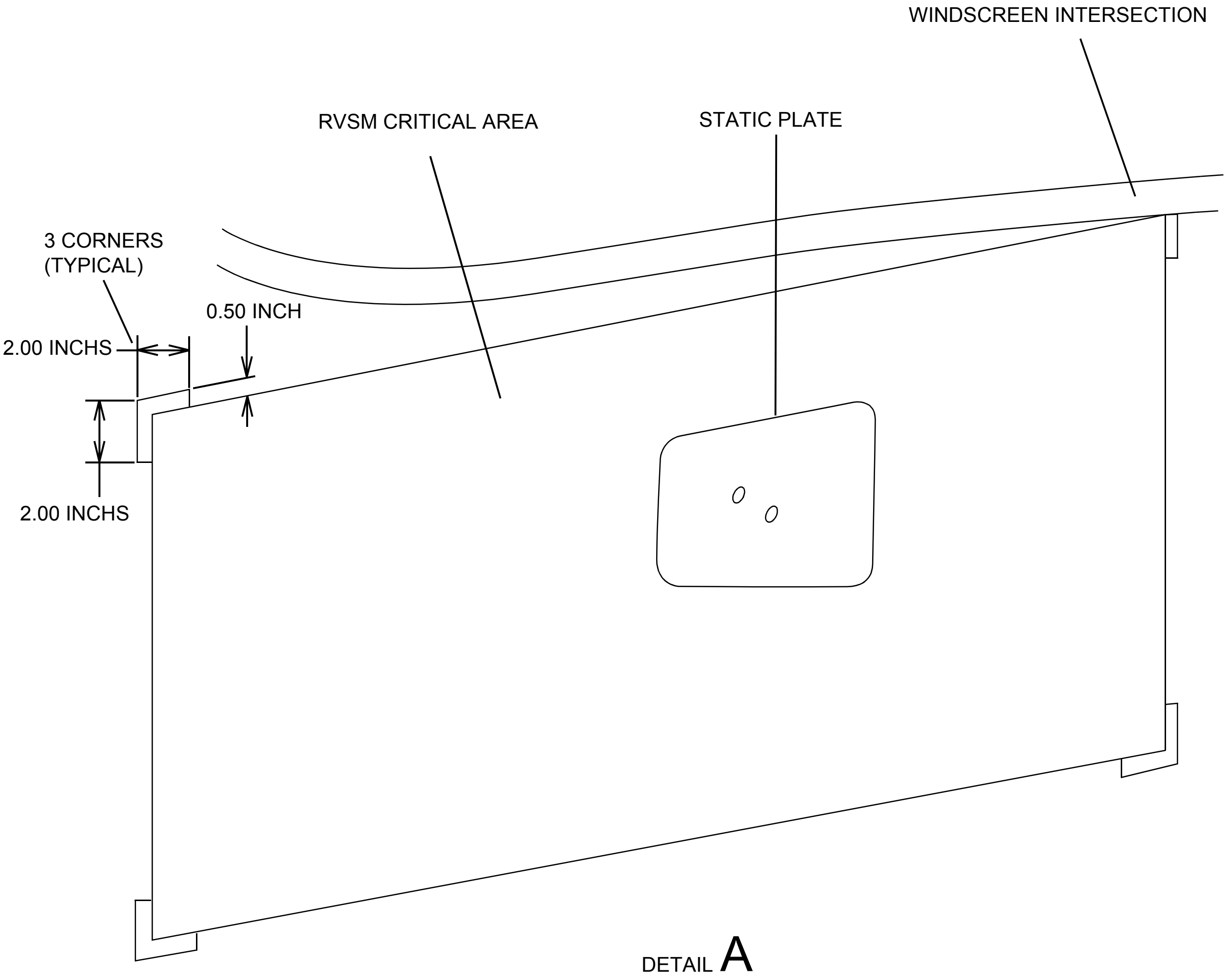
NOTE: Markings may be silk-screened using suitable materials as alternative to urethane paint.

(6) Apply MIL-C-83286 or Sterling U-Series urethane paint to the cutout notch areas in the template (Ref. AMM 125/H-20 Chapter 20-10-228, 201, paragraph 5.A. (1) thru (3).

(7) Remove and properly dispose of all barrier materials, tape and templates from the RVSM critical areas.

F. Close Up (All Airplanes)

(1) Make sure that the work area is clean and clear of tools and other equipment.



NOTE:

1. THE CORNER MARKING MUST BE VISIBLE TO THE PERSON CONDUCTING THE VISUAL INSPECTION. ANY CONTRASTING COLOR OF THE CORNER MARKING IS ACCEPTABLE
2. DIMENSIONS ARE ONLY SUGGESTED.
3. REAR UPPER LOCATION IS TO BE VERTICAL STRIPE ONLY.

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Figure 603
RVSM Critical Area Marking

NAVIGATION
FLIGHT ENVIRONMENT DATA
SINGLE ISOLATION VALVE ASSEMBLY
REMOVAL/INSTALLATION

1. INFORMATION

Equipment/Material	Part/Item No.
Wire, corrosion resistant	651 (Ref. AMM 125/H-20, 20-95-601)

2. ISOLATION VALVE AND MOUNTING BRACKET ASSEMBLY

A. Removal

	MECH	INSP
(1) Remove the side panel from the right-hand side console to get access to the valve assembly (Ref. Figure 401).		
(2) Cut and remove the lock wire and disconnect the pipes from the valve.		
(3) Remove the stiffnuts, washers and bolts that attach the valve mounting bracket assembly and the isolation valve to the top of the console.		
(4) Lower the mounting bracket assembly and the isolation valve until the operating spindle is disengaged from the valve boss top rivet. Withdraw the assembly from the side console. **NOTE** If it is necessary to remove the isolation valve to replace it; remove and keep the special adapters for installation to the new valve.		
(5) If it is necessary to remove the operating spindle assembly from the side console, remove the stiffnuts, washers and bolts that secure the stop plate to the side console, and withdraw the spindle assembly.		

B. Installation

NOTE: If a new isolation valve is being installed, the Saunders adapters issued with the new valve must be removed and the correct special adapters (removed from unserviceable valve) installed in their place.

	MECH	INSP
(1) If applicable, install the operating spindle assembly (Ref. Figure 401). (a) Make sure that the lock plate is attached correctly to the stop plate. (b) Insert the operating handle upwards through the aperture, align the holes in the stop plate and console and insert the bolts. (c) Make sure that the operating handle is pointing aft in the NORMAL (open) position. (d) Attach from underneath with washers and stiffnuts.		
(2) Move the valve boss until the top rivet is aligned fore and aft (valve fully open).		
(3) Install the isolation valve and mounting bracket assembly, and put the operating spindle fork over the top rivet.		
(4) Attach the mounting bracket with the bolts, washers and stiffnuts to the side console.		
(5) Turn the operating handle and make sure that full and free operation of the valve is achieved. Return the handle to its NORMAL (open) position.		
(6) Reconnect the pipes and lock wire (Item 651).		
(7) Do a pressure test on the right hand pitot system, (Ref. 34-11-19, 201).		
(8) Install the side panel to the console.		

C. Close-Up

	MECH	INSP
(1) Make sure the work area is clean and clear of tools and other equipment.		

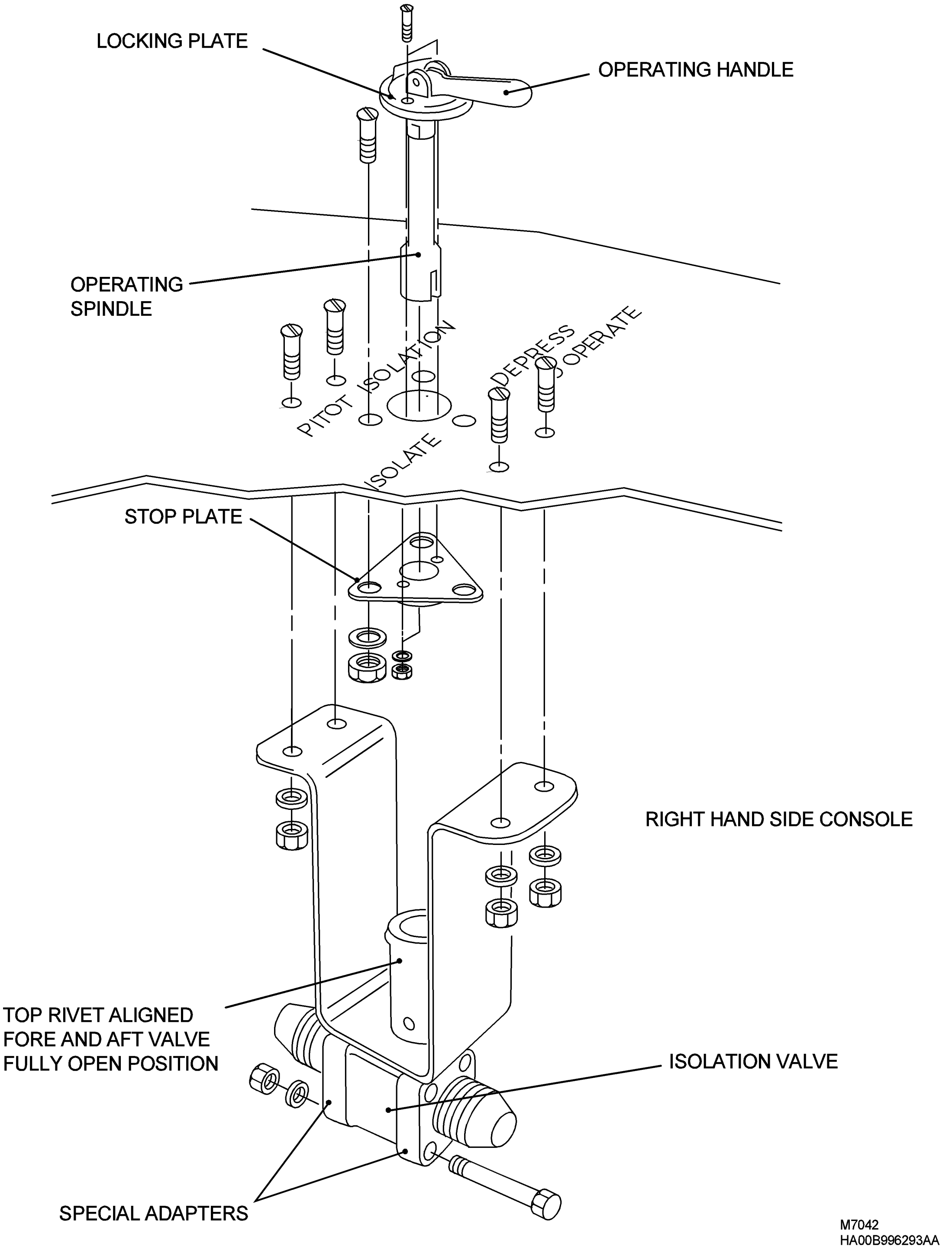

Figure 401
Single Isolation Valve Installation

OUTSIDE AIR TEMPERATURE SYSTEM - DESCRIPTION AND OPERATION

1. General

The system, has a ratiometer-type temperature indicator and a platinum-resistance type air temperature bulb and derives its d.c. supply from busbar PE. The air temperature bulb is on the left-hand side of the front fuselage, the indicator is on the left-hand forward panel of the pilots' control pedestal.

Changes in the outside ambient air temperature cause proportionate changes in the resistance of the platinum wire resistance unit within the bulb. Through a suitable connection, the resistance unit becomes part of a bridge network within the instrument, across which are connected two coils pivoted in permanent but unequal magnetic fields. Changes in the bulb resistance create a greater effect on the current flow in one coil than in the other, causing movement of the indicator pointer over the scale.

A switch situated adjacent to the indicator lets the fuel temperature be shown.

OUTSIDE AIR TEMPERATURE BULB - REMOVAL/INSTALLATION

1. Outside air temperature bulb

A. Removal

(1) On panel DA-D, open circuit breaker OAT & FUEL TEMP, (Chapter 24, ELECTRICAL POWER).

(2) Disconnect the plug and socket assembly.

(3) Undo the union nut and remove the bulb.

B. Installation

(1) Make sure that the locking bush is installed correctly on the bulb stem and that the bulb is clean and undamaged.

(2) Thread the bulb through the mounting orifice and finger tighten the union nut.

(3) Position the bulb so that the probe points forward and is parallel with the fuselage fore and aft line, and fully tighten the union nut.

(4) Connect and tighten the plug and socket assembly; wirelock.

(5) Close the related circuit breaker (Chapter 24, ELECTRICAL POWER).

(6) Energize busbar PE and make sure that the indicator registers the outside ambient temperature.

(7) De-energize the busbar.

NAVIGATION
ATTITUDE AND HEADING
ATTITUDE HEADING REFERENCE SYSTEM
DESCRIPTION AND OPERATION

1. DESCRIPTION

A. General

The AHC-3000 Attitude Heading Reference System (AHRS) generates attitude and heading data, and shows it on the Primary Flight Display (PFD). The attitude data provides pilot orientation to the airplane's axes inclination with respect to the horizon. The heading display provides direction data with respect to the nose of the airplane.

The AHRS has the units that follow:

- Two Attitude Heading Computers (AHC).
- Two Flux Detector Units (FDU).
- Two External Compensation Units (ECU).

The AHC is a solid-state strap-down reference system that generates angular rate and linear acceleration about the body axis of the airplane. It then digitally processes this data to get 3-axis angle, rate, and acceleration data.

The AHC has a DG mode (free gyro) that can be activated via discrete inputs.

The FDU is a gimballed 2-axis magnetic sensor that detects the horizontal component of the earth's magnetic field. The flux detector uses a pendulous sensing element to detect the direction of the earth's magnetic field. Precise alignment along the airplane longitudinal axis and compensation adjustment gives an accurate heading reference.

The ECU is installed near to the AHC and has the particular airplane AHRS alignment and compass correction parameters. It is re-programmed during AHRS levelling or a compass swing procedure.

The PFD shows attitude, heading, airspeed, altitude, vertical speed, Flight Control System (FCS) annunciations, and navigation data. Refer to Figure 1 for the PFD in a typical cruise configuration.

B. Attitude

The attitude data on the PFD shows the inclination of the airplane's axes with respect to the horizon. The attitude display utilizes a full sky/ground attitude "ball" with the sky and earth separated by a horizon line. An Aircraft Symbol is superimposed over the center of the attitude ball (Ref. Figure 1).

Chevrons are shown for excessive pitch angles. The display is de-cluttered if the airplane is flown in an Unusual Attitude.

C. Heading

The PFD shows either a full Compass Rose or a partial Compass Arc immediately beneath the attitude ball. The current heading is shown at the Lubber Line. This display can have a Selected Heading Bug (Ref. Figure 1). The pilot uses the HDG (Heading) rotary switch on the Flight Guidance Panel (FGP) (Ref. Figure 2) to control the Bug.

If the Heading Bug does not show on the compass arc, a heading vector dashed line is shown (Ref. Figure 3).

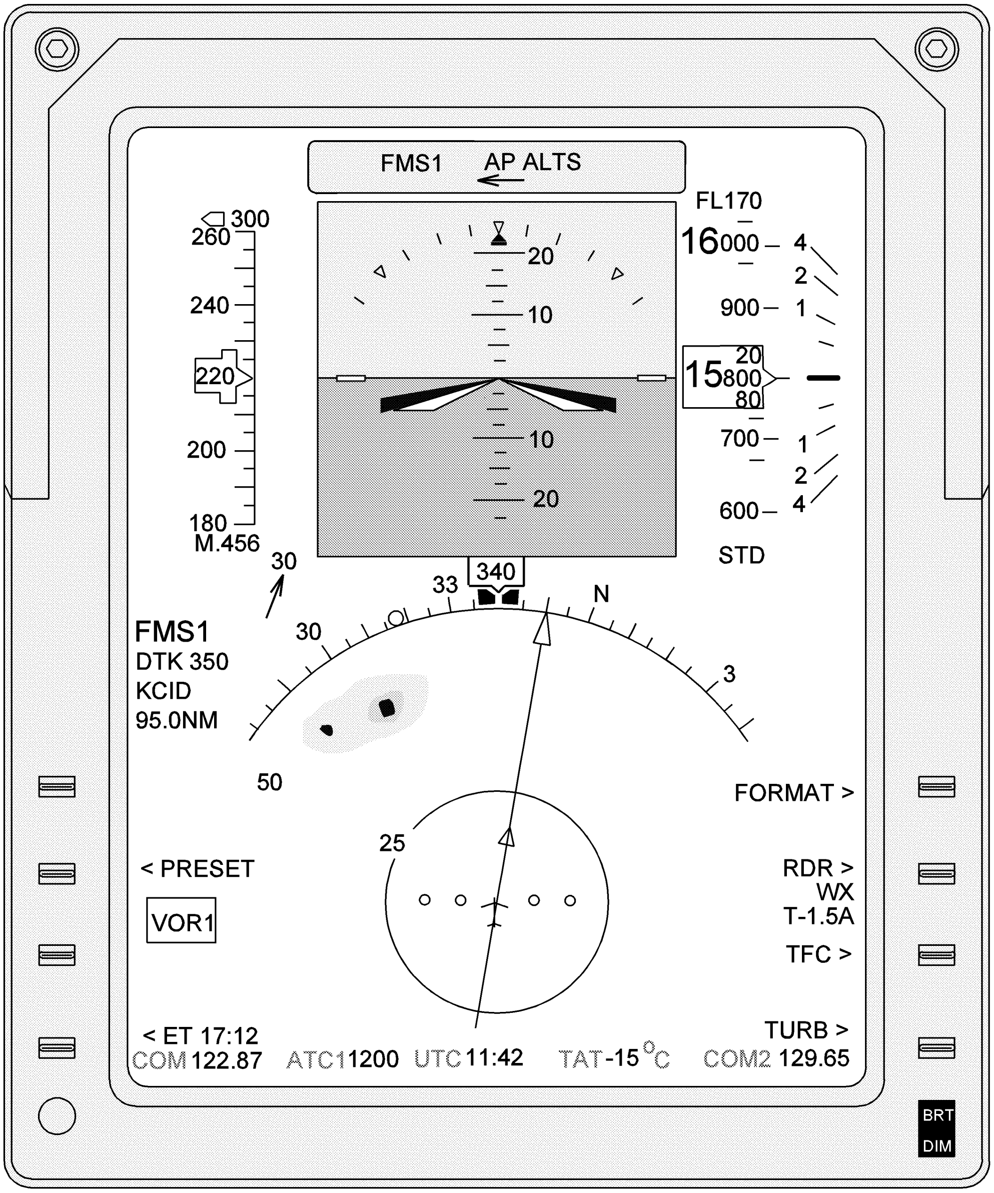

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Figure 1
Typical PFD Cruise Display

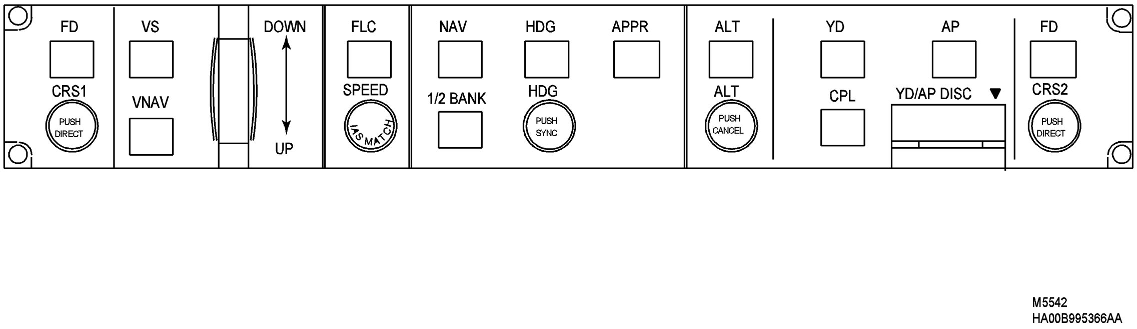

Figure 2
Flight Guidance Panel

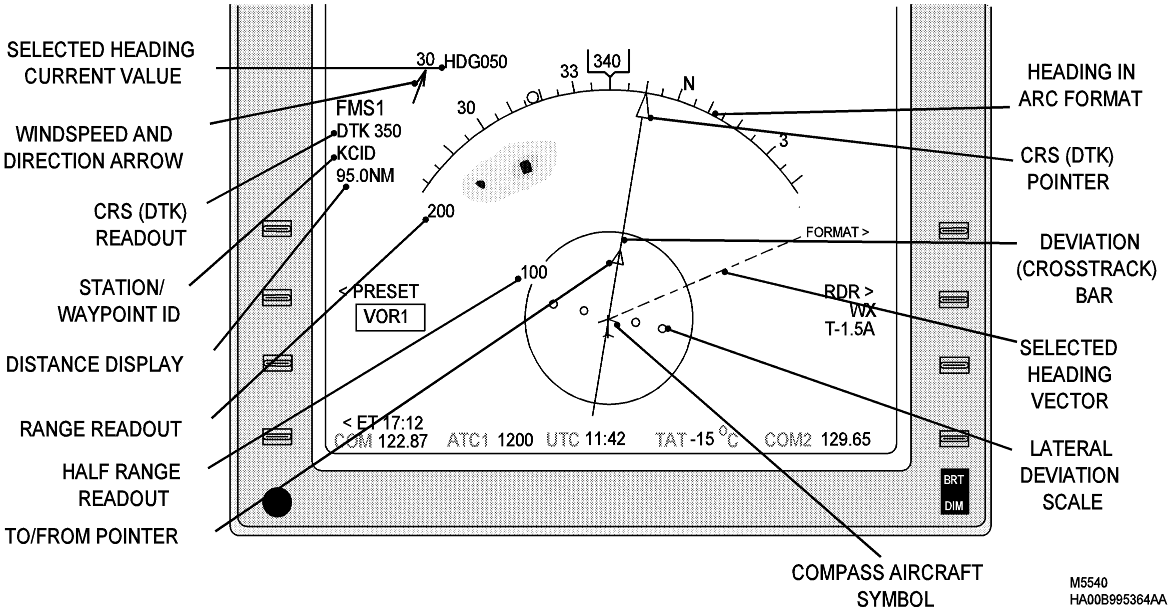

Figure 3
Heading Display with Heading Vector Active

2. OPERATION

A. Attitude Display - Controls

Attitude/Heading Source (AHS) Reversion	…	The AHS reversion annunciator/switches on the lower left and right instrument panels selects which sensor will be the onside attitude/heading source. If the No.1 AHS fails the left reversion switch will connect the No.1 (left) PFD and MFD to the No. 2 AHS and display cross-side air data. If the No.2 AHS fails the right reversion switch will connect the No.2 (right) PFD and MFD to the No.1 AHS and display cross-side air data. The PFD message window (to the left of the Airspeed Display) is used to annunciate when the onside sensor is not used and/or when both sides use a common sensor. The AHS annunciator/switches selects the cross side sensor for display. Both sides show either AHS1 or AHS2 in haloed white letters inside an “inverse video” amber box in the PFD message window, which shows the actively selected AHS source (Ref. Figure 4).

B. Attitude Display - Annunciators

Aircraft Symbol	…	The “V” shaped Single Cue Aircraft Symbol is in the center of the Attitude Display (Ref. Figure 1). The optional “split T” shaped Split Cue Aircraft Symbol replaces the Single Cue when optional cross-pointers are used for the Flight Director (Ref. Figure 5). Both Aircraft Symbols are black with a white border.
Pitch Tape	…	The white Pitch Tape (Ref. Figure 6) moves vertically in pitch with respect to the Aircraft Symbol. The current pitch value is shown at the Aircraft Symbol. Red Excessive Pitch Chevrons are shown when excessive pitch occurs. The entire Pitch Tape rotates in roll.
Roll Scale	…	The Roll Scale (Ref. Figure 1) is at the top of the Attitude Display, and makes an arc between the Airspeed Indicator and the Altimeter. The white triangular Roll Pointer is always shown with its apex at the current roll value.
Horizon Line	…	A white Horizon Line separates the Sky and Ground displays. The Horizon Line is part of the Pitch Tape, and pivots in roll around the Aircraft Symbol. For pitch values other than zero, an imaginary vertical line through the center of the Aircraft Symbol establishes the pivot point.
Sky/Ground In Fill	…	The area of the Attitude Display which represents the sky (above the horizon line in level flight) is in filled cyan. The area of the Attitude Display which represents the ground (below the horizon line in level flight) is in filled brown.
ATT (Attitude Flag)	…	When the Roll or Pitch angle input has an SSM (Sign Status Matrix) of NCD (No Computer Data), Fail or Missing, then the attitude ball is removed. There is a red, boxed, “ATT” annunciation above the Aircraft Symbol (Ref. Figure 7), which flashes for 5 seconds, then stays steady.
ATT/HDG ALIGNING	…	When the AHS is in align mode on the ground, a windowed, white, “ATT/HDG ALIGNING DO NOT TAXI” legend is shown above the Aircraft Symbol. It overwrites the pitch tape. When the AHS is in align mode in flight, the legend is changed to “ATT/HDG ALIGNING”. The window background color is dim blue, and overwrites the Pitch Tape.

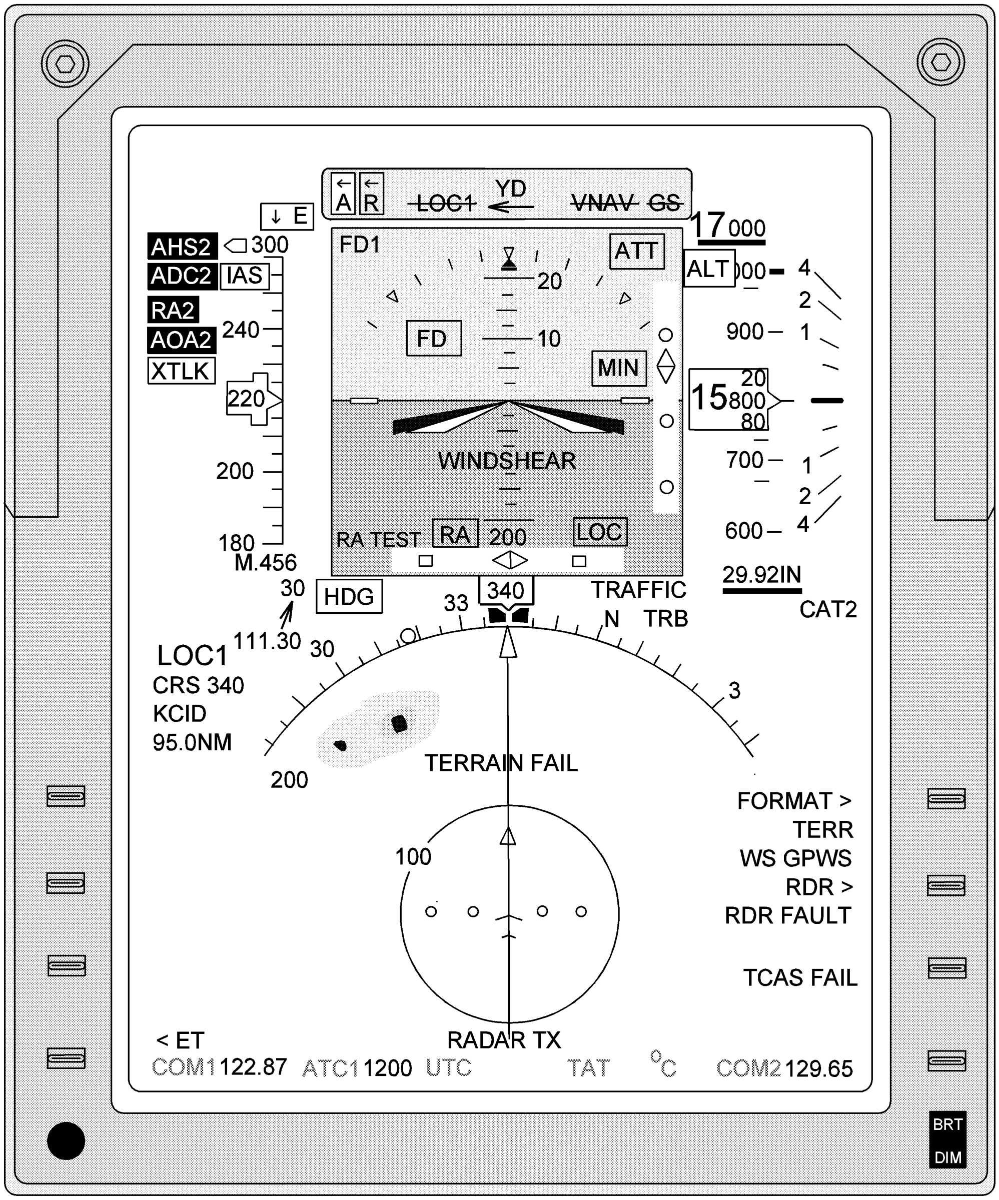

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Figure 4
PFD Amber Display Messages

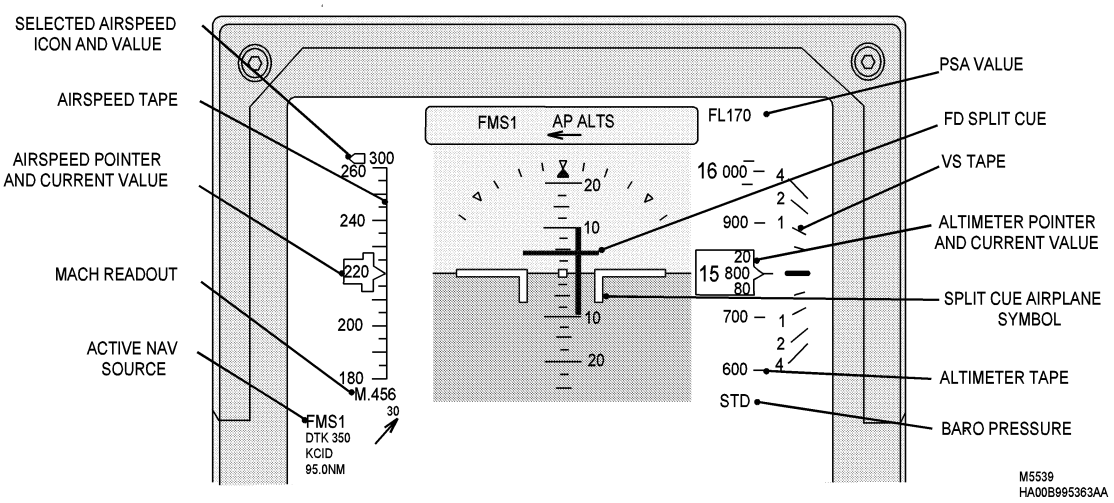


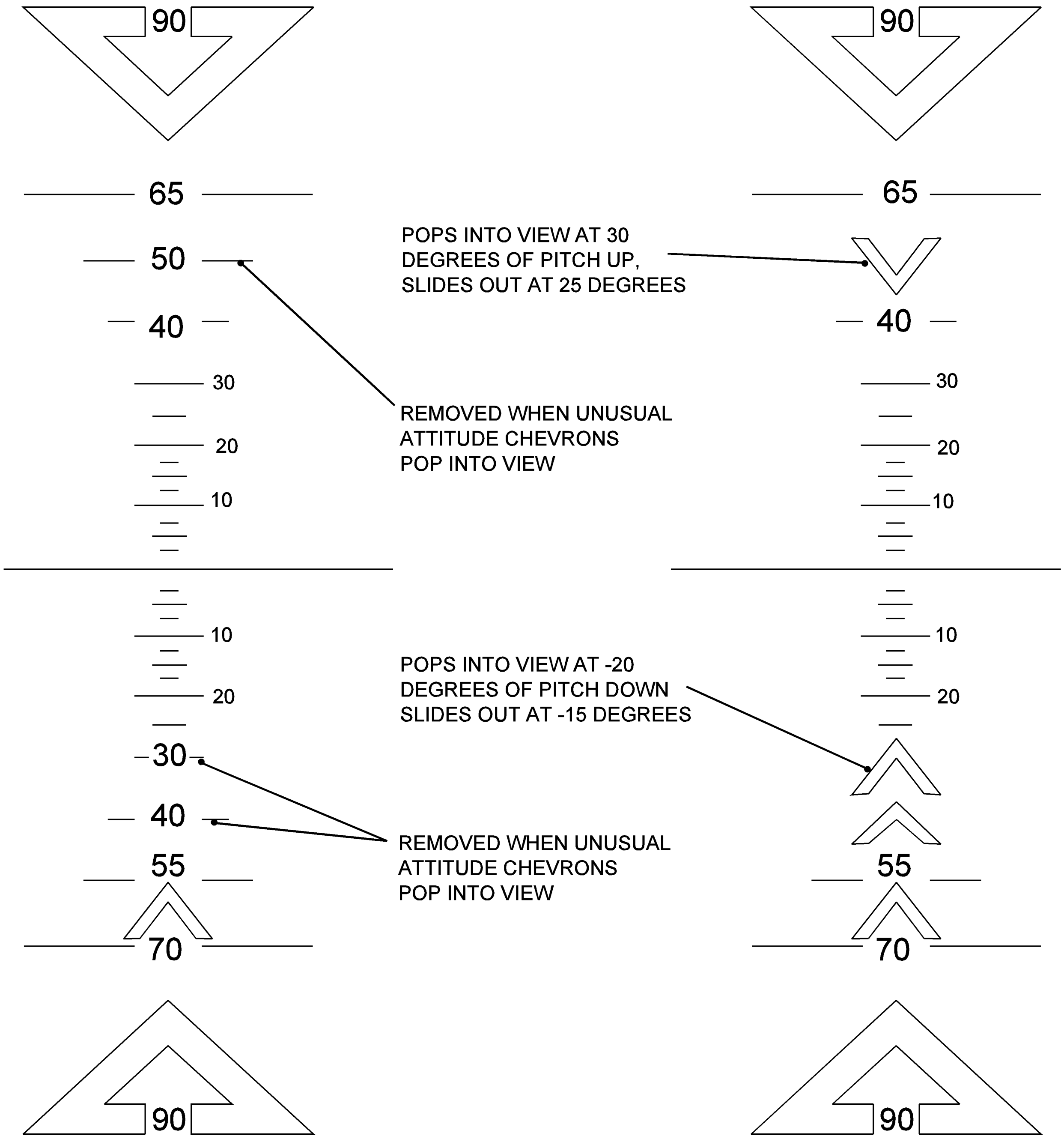
Figure 5
Optional Split Cue Attitude Display

C. Unusual Attitude

The PFD display is decluttered to make sure the pilot recognizes and corrects an Unusual Attitude. All data that is not necessary is removed from the display. The only data that is kept on the display is engine information, attitude, airspeed, altitude, vertical speed, compass, AHS Reversion, Air Data Computer (ADC) Reversion, Yaw Damper (YD) disengage, Autopilot (AP) engage/disengage, TRIM fail and Mistrim annunciations.

D. Slip/Skid Indicator

The Slip/Skid Indicator is a white rectangular symbol at the base of the Roll Pointer, which moves laterally with respect to the Roll Pointer, and proportionally to the lateral acceleration (Ref. Figure 1). The Slip/Skid Indicator uses the base of the Roll Pointer as its reference, and rotates with the Roll Pointer and moves laterally with respect to it. A zero lateral acceleration input causes the rectangular symbol to be aligned with the base of the Roll Pointer.



POPS INTO VIEW AT 30 DEGREES OF PITCH UP, SLIDES OUT AT 25 DEGREES

REMOVED WHEN UNUSUAL ATTITUDE CHEVRONS POP INTO VIEW

POPS INTO VIEW AT -20 DEGREES OF PITCH DOWN SLIDES OUT AT -15 DEGREES

REMOVED WHEN UNUSUAL ATTITUDE CHEVRONS POP INTO VIEW

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Figure 6
Pitch Tape Detail

E. Heading Display Controls

The position of the Heading Display is set by the heading supplied by the currently selected Attitude Heading System (AHS).

Mode control	…	The MODE annunciator/switch on the bottom of the left and right instrument panels is used to select either the slaved mode (NORM) or the direct gyro mode (SLEW). In the NORM mode the heading computations are slaved to the flux detector while in the SLEW mode the flux detector is not used.
Slew control	…	The slew control switch is a momentary action switch that is operational in both slaved (NORM) or DG (SLEW) modes. When operating in DG (SLEW) mode the slew control switch is used to set the current airplane heading. Use of the slew control causes the heading computations in the computer (and the heading displayed on the compass cards) to slew toward the selected direction. However, when the slew operation has ceased, the heading will slowly slave back to the heading sensed by the flux detector.
Selected Heading	…	The Selected Heading Bug is controlled by the HDG rotary switch on the FGP. The center “PUSH SYNC” push button switch on the HDG switch sets the Heading Bug to the current heading (Lubber Line).
FORMAT	…	Each second push of the FORMAT [R1] LSK selects either the Rose, Arc or Map format to be shown (Map is only included if FMS is the active Navigation source). A cyan “FORMAT>” legend is shown adjacent to the LSK. The right-facing caret is only shown when the LSK has FORMAT functionality.
RANGE (DCP)	…	The RANGE rotary switch on the DCP controls the range shown on both the on-side PFD and MFD. Two range values are tracked by the PFD: TCAS Range and non-TCAS Range (Normal Range). There can be only one range value on each side of the airplane for each type of range.
RDR	…	Push the RDR [R2] LSK to overlay Radar returns on compatible formats. Refer to the Weather Radar System, (Ref. 34-40-15, 1).
TFC	…	Push the TFC [R3] LSK to overlay TCAS Traffic displays on compatible formats. Refer to the Traffic Alert and Collision Avoidance System, (Ref. 34-50-35, 1).

F. Heading Display - Annunciators

Heading Marks	…	White Tick marks are shown every 5 degrees. White Heading numbers are shown at 30 degree marks, with white “N”, “E”, “S” and “W” legends which show the cardinal points.
Lubber Line	…	The Lubber Line is a fixed caret symbol at the top of the Compass Rose or Arc, with the Digital Heading Readout inside it. The Lubber Line has a grey vertical line either of the Digital Heading Readout, and a grey lower line below it. The lower line has an arrow which points downwards to the Aircraft Symbol.
Digital Heading Readout	…	A white, 3 digit, Heading Readout is shown at the Lubber Line. This Digital Heading Readout is the same value as the reading on the Compass Rose or Arc directly under the Lubber Line.

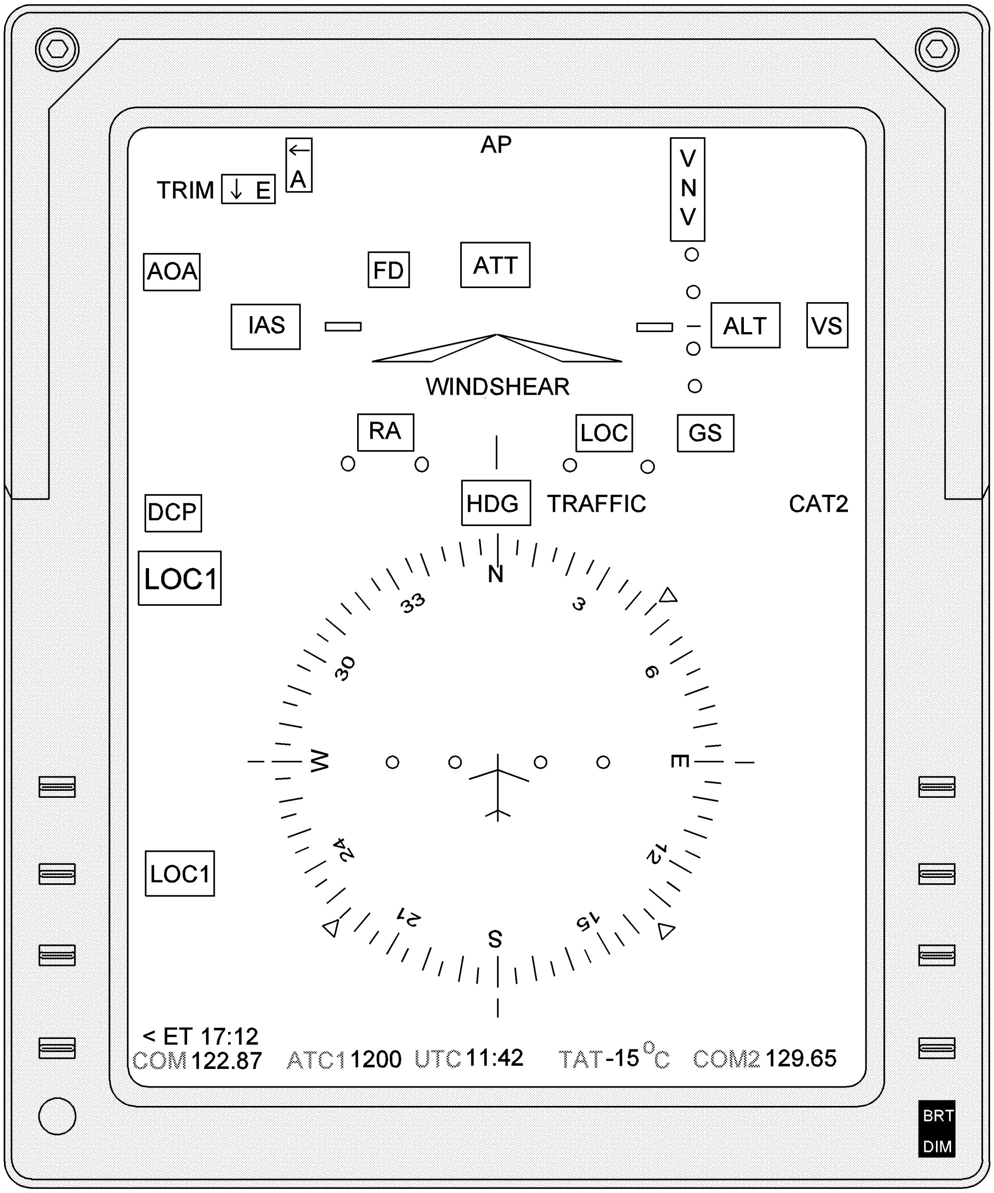

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Figure 7
PFD Space Utilization for Red Messages

Heading Flag	...	When the Heading input has an SSM (Sign Status Matrix) of NCD (No Computer Data), Fail or Missing, then the Compass Rose or Arc turns so that north is at the top, and the Lubber Line around the Digital Heading Readout is removed. A red, boxed, “HDG” annunciation replaces the Digital Heading Readout, and it flashes for 5 seconds then stays steady (Ref. Figure 7).
Heading Source	...	The Heading Source is shown to the right of the Digital Heading Readout, and is either blank (for magnetic heading source), TRU (for true) or DG (for Directional Gyro). DG is white. TRU is usually white, but turns amber and flashes for 5 seconds if the barometric altitude is less than 10,000 feet.
Compass Reference Marks	...	Compass Reference Marks are shown in the Compass Rose mode only, and are shown outside the Rose. There are four white triangular pointers at ± 45 and ± 135 degrees from the Lubber Line. There are three white tick marks, at 90, 180, and 270 degrees from the Lubber Line.
Selected Heading Bug	...	The Selected Heading Bug is a dual, filled “rectangular”, cyan bug, shown on the Compass Rose, Arc or Map. In the Arc and Map modes, whenever the Selected Heading value is changed, a magenta dashed vector line is shown, with its source at the compass center and it extends radially to the current position of the Selected Heading Bug.
Digital Selected Heading Readout	...	This is a 3 digit readout of the Selected Heading, and is shown to the left of the Heading Readout. The legend HDG is shown before the Selected Heading Readout (Ref. Figure 3). The legend and readout are in cyan. The legend and readout are shown while the Selected Heading value changes, and will show for 5 seconds after the value becomes stable.
RANGE Readout	...	This is an up-to-3 digit readout in an Arc or Map display, of the current Range selected, in nautical miles. The Range Readout is shown beneath the left corner of the Compass arc, and is in white (Ref. Figure 3). The Compass arc is used as the Range arc. The Half-Range arc is shown half way between the Aircraft Symbol and the Heading arc. A white, up-to-3 digit, Half-Range Readout, is shown in the left part of the Half-Range arc.

ATTITUDE HEADING REFERENCE SYSTEM - REMOVAL/INSTALLATION

1. Attitude heading reference computer (AHC) *(Figure 401)*

A. Preliminary procedures

(1) Open and safety tag the relevant circuit breakers that follow (Chapter 24, ELECTRICAL POWER):

Panel	Label
DA-A	AHRS 1 PRI
DA-A	AHRS 1 SEC
DA-A	AHRS 2 PRI
DA-A	AHRS 2 SEC

(2) Make sure the airplane busbars are de-energized (Chapter 24, ELECTRICAL POWER).

B. Removal

(1) Remove the left side floor coverings and panels between frames 11 and 12 (No.1 AHC) and frames 13 and 14 (No.2 AHC) to get access to the relevant computer.

(2) Remove the locking wire and slacken the attachment clamps and move the unit straight out from the mounting tray.

CAUTION: DO NOT LIFT THE COMPUTER UP OR MOVE IT FROM SIDE TO SIDE UNTIL THE REAR CONNECTOR IS CLEAR OF THE PANEL CONNECTOR.

(3) Remove the computer from the mounting tray.

(4) Install protective caps to the exposed electrical connections.

C. Installation

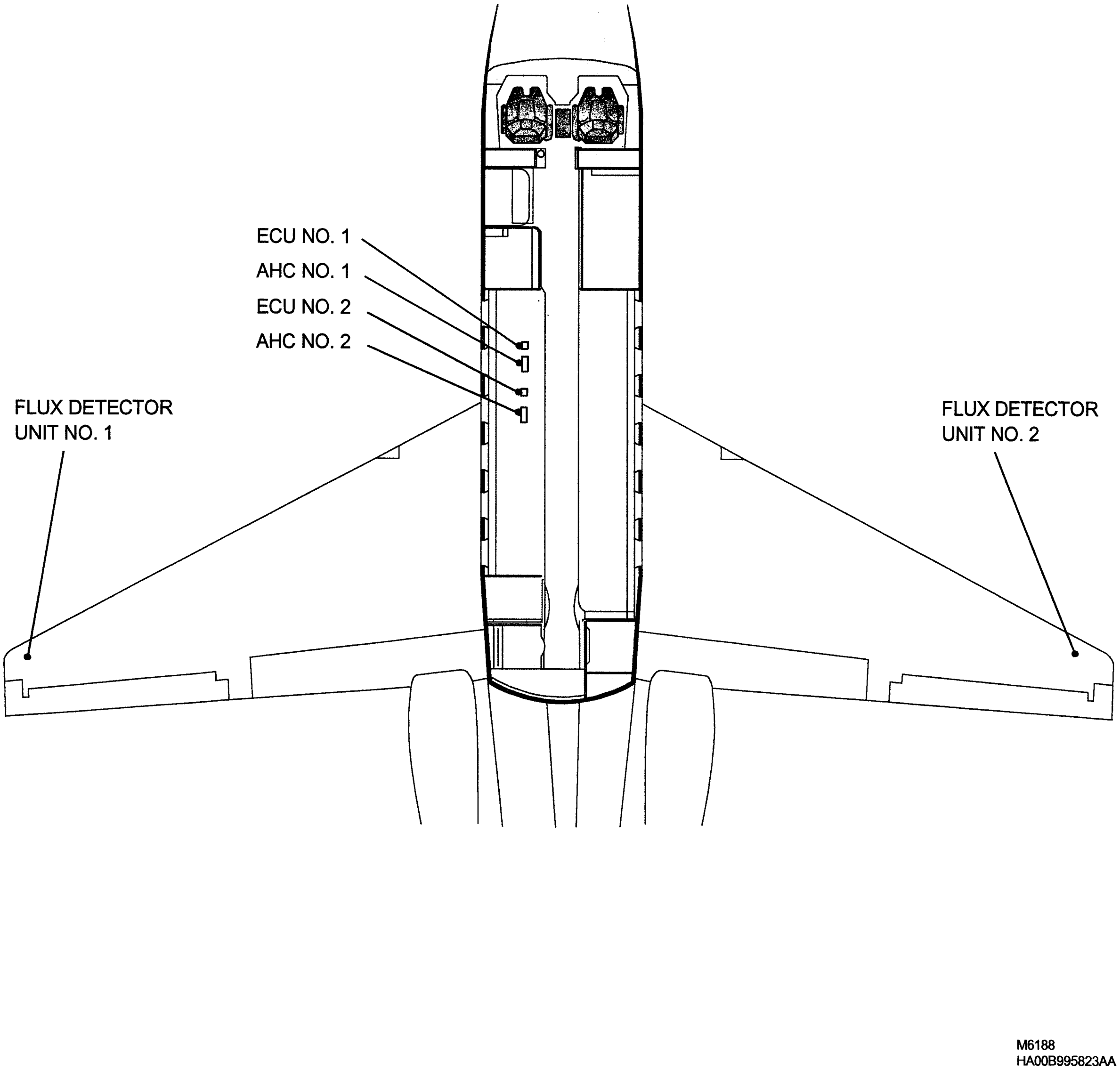
(1) Remove any caps from the electrical connections.

(2) Carefully move the unit squarely into the mounting tray until the rear connectors are correctly mated.

(3) Engage and tighten the securing clamps and wirelock.

(4) Remove the safety tags and close the circuit breakers opened in paragraph 1.A. (Chapter 24, ELECTRICAL POWER).

(5) Install any panels and floor covering removed at paragraph 1.B. (1) Chapter 25, EQUIPMENT AND FURNISHING).



AHC and ECU equipment locations
Figure 401

(6) Do the AHRS test procedure (ADJUSTMENT/TEST).

D. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous items of equipment.

2. External compensation unit (ECU) *(Figure 401)*

CAUTION: IF AN ECU IS REPLACED AN AHRS ALIGNMENT PROCEDURE (COMPASS SWING) MUST BE DONE.

A. Removal

(1) Do the preliminary procedure paragraph 1.A.

(2) Remove the left side floor coverings and panels between frames 11 and 12 (No.1 ECU) and frames 13 and 14 (No.2 ECU) to get access to the relevant unit.

(3) Disconnect the electrical connector from the ECU socket and install dust caps.

(4) Remove the two screws that attach the ECU to the mounting and remove the ECU.

B. Installation

(1) Put the ECU in position on the mounting and install the two attachment screws.

(2) Remove the dust caps and connect the electrical connector to the ECU socket.

(3) Remove the safety tags and close the circuit breakers opened in paragraph 1.A. (Chapter 24, ELECTRICAL POWER).

(4) Install any access panels and furnishings removed at paragraph 1.B. (1).

(5) Do the AHRS test procedure (ADJUSTMENT/TEST).

C. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous items of equipment.

3. Flux Detector Unit (FDU)

A. Removal

(1) Do the preliminary procedure paragraph 1.A.

(2) Remove the bolts securing the FDU access panel on top of the appropriate wing tip, and remove the access panel.

(3) Remove and retain the three non-magnetic bolts and washers securing the FDU to the wing structure.

(4) Remove and retain the bolts and washers securing the two 'P' clips.

(5) Remove the bolts that attach the lower wing tip access panel forward of the FDU, and remove the access panel.

(6) Remove the bolt that attach the FDU connector 'P' clip to the aircraft structure. Disconnect the electrical connector and withdraw the cable assembly complete with 'P' clips, and the FDU from the upper access aperture.

(7) Note the position and then remove and retain the 'P' clips on the cable and connector assembly.

B. Installation

Equipment/Materials	Part/Item No.
Polysulphide Sealant	314 (Chapter 20-95-301)
Cleaner, solvent	201 (Chapter 20-95-201)
Aluminium wool	Local supply

(1) Install the 'P' clips removed in paragraph 3.A.(7) to the cable and connector assembly at the positions noted.

(2) Position the FDU on to its mounting structure with the degree calibration marks forward, and lightly secure using the three non-magnetic bolts and washers.

(3) Feed the connector and cable assembly forward through to the lower access aperture. Mate the two electrical connectors, and secure the connector and the cable assembly to the aircraft structure using the 'P' clips and bolts and washers.

(4) With the FDU forward securing bolt central in its adjustment slot, align the unit to within ± 2.0 degrees of the aircraft longitudinal axis by positioning the flat surface of the FDU connection chamber parallel to the inboard rib. Fully secure the unit in position by tightening the three securing bolts.

(5) Clean off old sealant from the wing apertures and access panels using cleaner (Item 201) and aluminium wool. Install the panels and secure using the bolts.

(6) Remove the safety tags and close the circuit breakers opened in paragraph 1.A.(1). (Chapter 24, ELECTRICAL POWER).

(7) Perform the AHRS alignment procedure (compass swing) (ADJUSTMENT/TEST).

(8) Do the AHRS test procedure (ADJUSTMENT/TEST).

(9) Seal the periphery of the access panels using sealant (Item 314).

C. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous items of equipment.

NAVIGATION
ATTITUDE AND HEADING
ATTITUDE HEADING REFERENCE SYSTEM
ADJUSTMENT/TEST

1. INFORMATION

Equipment/Materials	**Part/Item No.**
Barfield Calibrated sight compass, P/N SC063 (or equivalent)	Local supply

NOTE: For airplanes that are not IFIS equipped paragraph 3.B. is to be carried out and for Airplanes that are IFIS equipped paragraph 3.C. is to be carried out.

2. ADJUSTMENT/TEST

A. Do a Test of the AHC or ECU

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual 523-0780107 Maintenance Section and do the test procedure for the No.1 or No. 2 Attitude Heading Reference System as necessary.

B. Do a Test of the Flux Detector Unit

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual 523-0780107 Maintenance Section and do the test procedure for the No.1 or No. 2 Flux Detector unit (FDU) as necessary.

3. AHRS, ESIS COMPASS AND E2B COMPASS ALIGNMENT (COMPASS SWING)

NOTE: The Flux Detector Unit (FDU) compensation and index adjustment procedure is required for all first time installations.

While you do a FDU compensation, make sure that airplane movement and that movement of personnel in the airplane is kept to an absolute minimum.

The FDU compensation and standby compass swing must be done in the open and away from the hangar area, metal structures and any magnetic interference. It is to be done with engines running and all normally operated Avionics and Electrical equipment must be energized.

The FDU compensation mode can only be accessed during AHC power up and with Weight on Wheels.

The Standby Compass - Standby Battery Operation is to be done with the engines running while using the Standby Battery Bus alone to operate the Standby Systems.

A. Preparation

(1) While you do this procedure the following systems must not be operated:

- Air conditioning
- Airframe Anti-ice

- Landing lights

B. Procedure (Non-IFIS Equipped Airplanes Only)

Action	Result
FDU Compensation Mode	
(1) Taxi/tow the airplane to a compass rose, or approved compass area, and put it in position on a north heading 0° (± 5°).	-
(2) Start and run both engines (Ref. 71-00-00, 501).	-
CAUTION *Make sure the pitot heaters do not overheat and that they are not switched on for longer than five minutes at one time.*	
(3) Switch on the systems that follow: Strobe lights Beacon lights Pitot anti-ice Stall warning anti-ice	-
(4) On panel DA-A open the circuit breakers AHRS 1 PRI and SEC	No.1 AHC is de-energized.
(5) On panel DA-A open the circuit breakers AHRS 2 PRI and SEC	No.2 AHC is de-energized.
(6) On the pilot’s aft bulkhead set the FDU 1 and FDU 2 switches to ON.	-
NOTE The ATT flag on both PFDs will be on for the duration of the calibration procedure.	
(7) On panel DA-A close the circuit breakers opened in 3.B. (4) to energize the No. 1 AHC	The left PFD, when AHC initilization is complete, will show an ATT flag and the heading will become valid.
(8) On panel DA-A close the circuit breakers opened in 3.B. (5) to energize the No. 2 AHC	The right PFD, when AHC initilization is complete, will show an ATT flag and the heading will become valid.
(9) On the pilot’s aft bulkhead set the MAINT switch to ON.	-
(10) Use the MFD line select keys go to the MAINTENANCE MENU format and enter the MDC DIAGNOSTIC DATA page.	-

Action	Result
(11) Use the MFD PREV/NEXT keys to view AHRS 1/2 data and BIN/HEX key to display data in the binary form.	-
(12) Observe the AHRS 1 and AHRS 2 labels: 351 bit 24	MFD: Verify bit 24 of label 351 is set to 1 as shown: AHRS 1: 351-xxx1 xxxx 1xxx 1xxx xxxx xxxx (x = n/a) AHRS 2: 351-xxx1 xxxx 1xxx 1xxx xxxx xxxx (x = n/a)
(13) Toggle pilot/co-pilot MODE switches from NORM to SLEW to NORM to start the alignment	The left and right PFDs show HDG flags (25 to 35 sec.) and then HDG flags are removed.
(14) On the E2B compass adjust the N/S adjustment screw as required.	-
NOTE The steps that follow may be done off the compass rose.	
(15) Move the airplane to a heading of 45° (± 5°) as indicated on the left and right PFDs.	-
(16) Toggle pilot/co-pilot MODE switches from NORM to SLEW to NORM to start the alignment	The left and right PFDs show HDG flags (25 to 35 sec.) and then HDG flags are removed.
NOTE At 180° make any necessary adjustments to the E2B compass using the N/S adjustment screw.	
(17) Repeat paragraph 3.B. (16) for the headings that follow: 90°, 135°, 180°, 225°, 270°. Monitor AHRS 1 and 2 labels 353 bit 11 during the alignment to make sure the bit is set to ‘0’	The left and right PFDs show HDG flags (25 to 35 sec.) and then HDG flags are removed.
(18) Repeat paragraph 3.B. (16) for the heading of 315°	The left and right PFDs show HDG flags (25 to 35 sec.) and then HDG flags are removed. If after 1 minute the heading does not become valid after completing the last compensation heading (315°), then the AHC is in an ‘out of limits’ condition. Abort the alignment by restarting the compensation at paragraph (4).
NOTE If after 1 minute the heading does not become valid after completing the last compensation heading (315°), and label 353 bit 12 is set to ‘1’ then the AHC is in an ‘out of limits’ condition. Abort the alignment by restarting the compensation at paragraph (4).	

Action	Result
Index Adjustment Procedure	
NOTE Max index compensation allowed is ± 5°. The slew switches will not drive the index beyond this limit.	
(19) Align the airplane on the compass rose to 0° ± 2° (North).	-
(20) Set the pilot/co-pilot MODE switches to SLEW and momentarily operate the pilot/co-pilot + and - switches	Left and right PFDs show HDG flags then the HDG flags are removed.
(21) Use the MFD FORMAT line select key to cycle the display until the MAINT. page selection is shown.	-
(22) Push the MFD FCS key	Left PFD shows FCS DIAGNOSTICS page.
(23) Push MFD NEXT MODE line select key to select INPUT MODE.	-
(24) Use the <MOVE CURSOR to select any input parameter line.	-
(25) Push the <SCROLL UP or <SCROLL DOWN as required to scroll to HDG MAG parameter	Right MFD shows left and right HDG MAG to the tenth of a degree.
(26) Set pilot's SLEW switch to either plus (+) or minus (-) to slew the AHRS 1 HDG MAG to 0° (± 0.1°)	Right MFD shows left HDG MAG to be 0° (± 0.1°)
(27) Set co-pilot's SLEW switch to either plus (+) or minus (-) to slew the AHRS 2 HDG MAG to 0° (± 0.1°)	Right MFD shows right HDG MAG to be 0° (± 0.1°)
(28) Toggle pilot/co-pilot MODE switches from NORM to SLEW to NORM.	-
(29) On the pilot's aft bulkhead set the FDU 1 and FDU 2 switches to OFF.	-
(30) A check of the alignment for the AHRS and the E2B will be done in paragraph 3.D.	-
Magnetometer Heading Sensor Calibration Sensor	
(31) On panel DA-A open circuit breaker ESIS MSU to de-energize the magnetometer heading sensor.	-

Action	Result
(32) Make sure the ESIS display is active	After attitude initialization is complete: • An attitude sphere and airplane symbol will show. • To the left of the attitude display is the airspeed information. • To the right of the attitude display is the altitude information. • The bottom will display a red X across the heading information.
(33) Align the airplane's fuselage as close as possible to Magnetic North.	-
(34) On the pilot's aft bulkhead set the MHS calibration switch to ON.	-
(35) On panel DA-A close the ESIS MSU circuit breaker.	-
(36) Slowly turn the airplane clockwise or counterclockwise, at a rate not to exceed 6° per second. The airplane will need to be turned 720° to 1080° to accomplish the calibration	At the indicator make sure of the following: • To indicate the heading data is not calibrated, 105° shifts in displayed heading value occurs approximately once a second. • The calibration process is aborted if the measured data would produce an incorrect Heading Read Out. • This causes the MHS to send a No Computed Data transmission status. • This indicates that the process needs to be restarted.
(37) Set the MHS calibration switch to OFF	If the MHS calibration was completed successfully NORMAL calibrated Heading Data will be displayed on the STBY indicator.
(38) A check of the alignment will be done at paragraph 3.D.	-

C. Procedure (IFIS equipped Airplanes only)

Action	Result
FDU Compensation Mode	
(1) Taxi/tow the airplane to a compass rose, or approved compass area, and put it in position on a north heading 0° (± 5°).	-

Action	Result
(2) Start and run both engines (Ref. 71-00-00, 501).	-
CAUTION *Make sure the pitot heaters do not overheat and that they are not switched on for longer than five minutes at one time.*	
(3) Switch on the systems that follow: Strobe lights Beacon lights Pitot anti-ice Stall warning anti-ice	-
(4) On panel DA-A open the circuit breakers AHRS 1 PRI and SEC	No.1 AHC is de-energized.
(5) On panel DA-A open the circuit breakers AHRS 2 PRI and SEC	No.2 AHC is de-energized.
(6) On the pilot’s aft bulkhead set the FDU 1 and FDU 2 switches to ON.	-
NOTE The ATT flag on both PFDs will be on for the duration of the calibration procedure.	
(7) On panel DA-A close the circuit breakers opened in (4) to energize the No. 1 AHC	The left PFD, when AHC initilization is complete, will show an ATT flag and the heading will become valid.
(8) On panel DA-A close the circuit breakers opened in (5) to energize the No. 2 AHC	The right PFD, when AHC initilization is complete, will show an ATT flag and the heading will become valid.
(9) Push STAT on CCP 2. Push Menu on CCP 2. Rotate the Menu ADV knob on the CCP 2 as required to move the focus indicator box to the Maintenance Menu line, and then press the CCP 2’s Push Select button.	MFD 2: Maintenance Main Menu page is displayed on the MFD 2 with the following selections: Current Faults, Aircraft History, ATA Index, LRU Index/Operations, MDC Setup, Configuration Data and Report Download.
(10) Press the MFD 2 Up and Down Keys as necessary to scroll cursor to the LRU Index/ Operations line. Then press the select key.	MFD 2 displays the LRU operations ATA 34-21 AHARS AHARS 1[2] page.
(11) Use the MFD 2 Tab key required to select the Binary Data Format from the HEX or Binary Data Format, Binary (31-09).	MFD 2 displays Diagnostic Data page ATA 34-21. Diagnostic data cycles from HEX format to Binary format.

Action	Result
(12) Observe the AHRS 1 and AHRS 2 labels: 351 bit 24	MFD: Verify bit 24 of label 351 is set to 1 as shown: AHRS 1: 351-xxx1 xxxx 1xxx 1xxx xxxx xxxx (x = n/a) AHRS 2: 351-xxx1 xxxx 1xxx 1xxx xxxx xxxx (x = n/a)
(13) Toggle pilot/co-pilot MODE switches from NORM to SLEW to NORM to start the alignment	The left and right PFDs show HDG flags (25 to 35 sec.) and then HDG flags are removed.
(14) On the E2B compass adjust the N/S adjustment screw as required.	-
NOTE The steps that follow may be done off the compass rose.	
(15) Move the airplane to a heading of 45° (± 5°) as indicated on the left and right PFDs.	-
(16) Toggle pilot/co-pilot MODE switches from NORM to SLEW to NORM to start the alignment	The left and right PFDs show HDG flags (25 to 35 sec.) and then HDG flags are removed.
NOTE At 180° make any necessary adjustments to the E2B compass using the N/S adjustment screw.	
(17) Repeat paragraph (16) for the headings that follow: 90°, 135°, 180°, 225°, 270°.	The left and right PFDs show HDG flags (25 to 35 sec.) and then HDG flags are removed.
(18) Repeat paragraph (16) for the heading of 315°	The left and right PFDs show HDG flags (25 to 35 sec.) and then HDG flags are removed. If after 1 minute the heading does not become valid after completing the last compensation heading (315°), then the AHC is in an ‘out of limits’ condition. Abort the alignment by restarting the compensation at paragraph 3.C. (4).
Index Adjustment Procedure	
NOTE Max index compensation allowed is ± 5°. The slew switches will not drive the index beyond this limit.	
(19) Align the airplane on the compass rose to 0° ± 2° (North).	-
(20) Set the pilot/co-pilot MODE switches to SLEW and momentarily operate the pilot/ co-pilot + and - switches	Left and right PFDs show HDG flags then the HDG flags are removed.

Action	Result
(21) Push Menu on CCP 2. Rotate the Menu ADV knob on the CCP 2 as required to move the focus indicator box to the FCS Diagnostic line, and then press the CCP 2's Push Select button.	MFD 2 displays FCS Diagnostic page.
(22) Push MFD NEXT MODE line select key to select INPUT MODE.	-
(23) Use the <MOVE CURSOR to select any input parameter line.	-
(24) Push the <SCROLL UP or <SCROLL DOWN as required to scroll to HDG MAG parameter	Right MFD shows left and right HDG MAG to the tenth of a degree.
(25) Set pilot's SLEW switch to either plus (+) or minus (-) to slew the AHRS 1 HDG MAG to 0° (± 0.1°)	Right MFD shows left HDG MAG to be 0° (± 0.1°)
(26) Set co-pilot's SLEW switch to either plus (+) or minus (-) to slew the AHRS 2 HDG MAG to 0° (± 0.1°)	Right MFD shows right HDG MAG to be 0° (± 0.1°)
(27) Toggle pilot/co-pilot MODE switches from SLEW to NORM to SLEW to NORM.	-
(28) On the pilot's aft bulkhead set the FDU 1 and FDU 2 switches to OFF.	-
(29) A check of the alignment for the AHRS and the E2B will be done in paragraph 3.D.	-
Magnetometer Heading Sensor Calibration Sensor	
(30) On panel DA-A open circuit breaker ESIS MSU to de-energize the magnetometer heading sensor.	-
(31) Make sure the ESIS display is active	After attitude initialization is complete: • An attitude sphere and airplane symbol will show. • To the left of the attitude display is the airspeed information. • To the right of the attitude display is the altitude information. • The bottom will display a red X across the heading information.
(32) Align the airplane's fuselage as close as possible to Magnetic North.	-

Action	Result
(33) On the pilot’s aft bulkhead set the MHS calibration switch to ON.	-
(34) On panel DA-A close the ESIS MSU circuit breaker.	-
NOTE A yellow CAL will be shown on the SFD after power up.	
(35) Slowly turn the airplane clockwise or counterclockwise, at a rate not to exceed 6° per second. The airplane will need to be turned 720° to 1080° to accomplish the calibration	At the indicator make sure of the following: • To indicate the heading data is not calibrated, 105° shifts in displayed heading value occurs approximately once a second. • The calibration process is aborted if the measured data would produce an incorrect Heading Read Out. • This causes the MHS to send a No Computed Data transmission status. • This indicates that the process needs to be restarted.
NOTE If the calibration switch is closed before the calibration is complete a red X might be shown on the compass card. Do not stop rotation of the airplane until calibration is complete. If the red X is shown repeat paragraphs 3.B. (30) through (35)	
(36) Set the MHS calibration switch to OFF	If the MHS calibration was completed successfully NORMAL calibrated Heading Data will be displayed on the STBY indicator.
(37) A check of the alignment will be done at paragraph 3.D.	-

D. Compass Card Correction

(1) Put the airplane on each heading listed in Table 501 and record the AHRS 1, AHRS 2, ESIS and E2B standby compass readings.

(2) Make sure the AHRS 1 compass system is within ± 1.0° of actual airplane heading.

(3) Make sure the AHRS 2 compass system is within ± 1.0° of actual airplane heading.

(4) Make sure the ESIS compass system is within ± 3° of actual airplane heading.

(5) Make sure the E2B STBY compass system is within ± 4° of actual airplane heading.

Table 501
Compass Swing Data Sheet

Actual	**AHRS 1 Compass**		**AHRS 2 Compass**		**ESIS Compass**		**E2B Stby Compass**	
Heading	Reading	Deviation	Reading	Deviation	Reading	Deviation	Reading	Deviation
0								
30								
60								
90								
120								
150								
180								
210								
240								
270								
300								
330								

E. Close Up

(1) Stop the engines (Ref. 71-00-00, 501).

NAVIGATION
LANDING AND TAXIING AIDS
VOR/ILS (NAV) SYSTEM (COLLINS VIR-432)
DESCRIPTION AND OPERATION

1. INTRODUCTION

The basic principle of operation for the VHF Omni-range (VOR) is that a VOR ground facility transmits two signals at the same time. One signal is constant, in all directions, while the other rotates about a point. The relationship between these two signals, when computed by the VIR-432 receiver, gives the airplane its radial position, in degrees, from that VOR station. Each VOR station also transmits a morse identification code. VOR ground stations are often co-located with DME ground stations (Ref. 34-50-05, 001) which makes it possible to pinpoint an airplanes distance from that ground station along the radial (Ref. Figure 1).

The lateral deviation bar, on the PFDs, moves left or right of the course pointer if the airplane strays from the course radial of the tuned VOR beacon.

The VOR/ILS system operates in the 108.00 to 117.95 MHz band with channels spaced at 50 kHz. There are 200 available channels.

The VOR system operates within the band 112.00 to 117.95 MHz and is intended for en-route navigation - it uses 120 of the available channels. The output power of a VOR station is enough to give a range of approximately 300 nautical miles.

There are VOR/ILS 1 and VOR/ILS 2 control switches on the pilot's and copilot's audio control panels. These switches control the audio level of the received transmissions from the VOR/ILS ground stations. The switches must be pulled-out and turned to control the volume.

Forty channels, in the 108.10 to 111.95 band, are allocated to the ILS localizer. The localizer beacon has a range of approximately 20 nautical miles.

The instrument landing system (ILS) is made up from three ground components as follows.

- Localizer Radio Transmitter:

  This provides an azimuth indication to guide the airplane to the end of the runway.

  The transmitter radiates a field pattern which develops a course down the centerline of the runway towards the middle and outer markers. The localizer provides course guidance throughout the descent path to the runway threshold. The radiated field pattern is modulated at two different frequencies. The right side of the pattern, along the normal approach path, is modulated at 150 Hz. The left side of the radiated pattern is modulated at 90 Hz. If the airplane strays into the left side, 90 Hz zone, the PFDs will give a 'fly right' instruction. If the airplane strays into the right side, 150 Hz, the PFDs will give a 'fly left' instruction.

  Any deviation, from the center of the localizer beam, is shown on a lateral deviation scale, located in a 'cut-out' section, at the bottom of the PFD attitude display. The scale is presented as two grey-dots either side of the center tickmark.

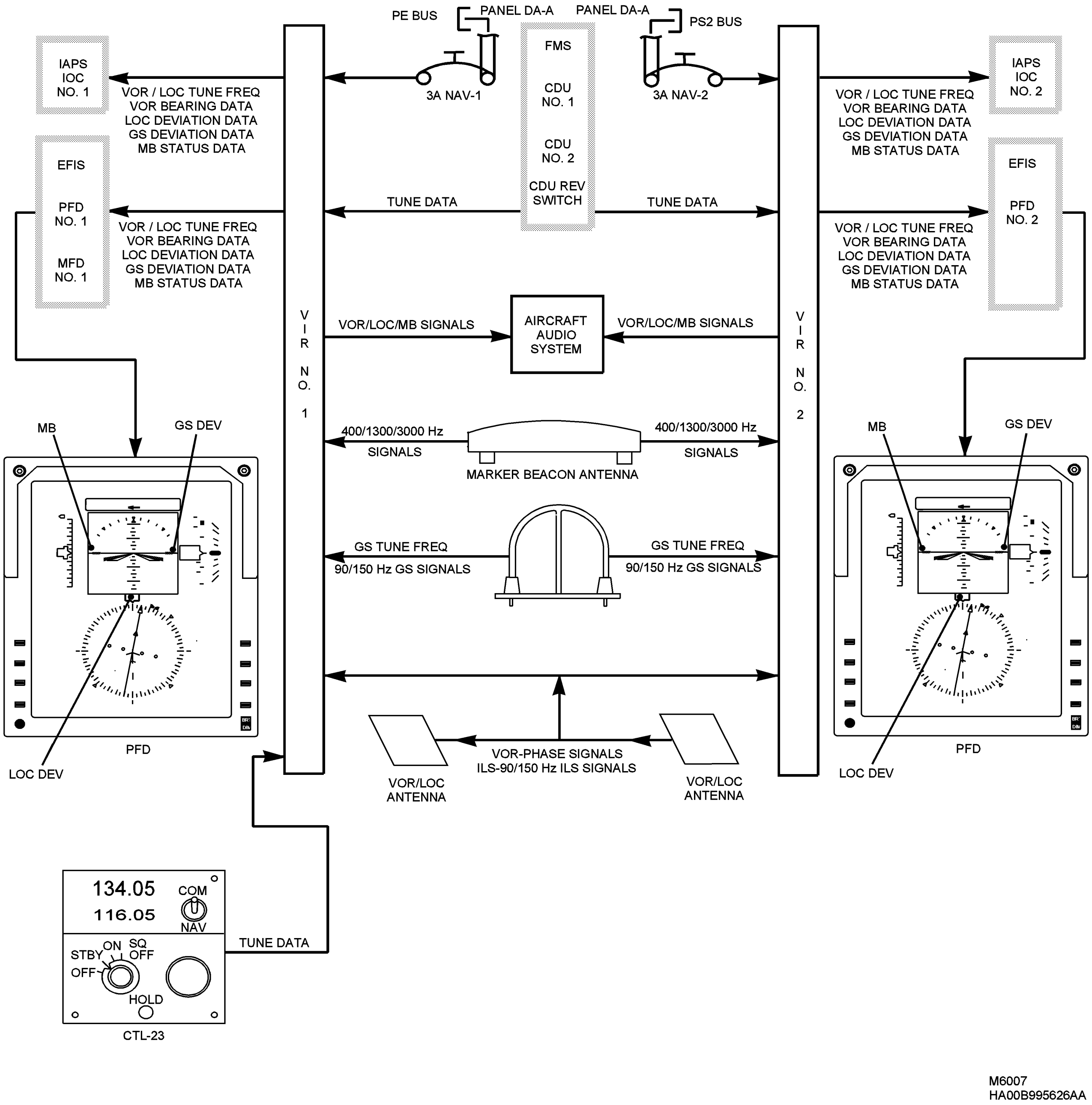


Figure 1
VIR-432 (VOR/ILS/MB) System

- Glideslope Radio Transmitter:

  This provides vertical guidance along the correct descent angle to the exact ‘touchdown’ point on the runway. The glideslope channels are in the UHF band, between 329.15 to 335.0 MHz. Each of the forty frequencies, allocated to the glideslope system, is paired with a localizer frequency. Pilot selection of the required localizer frequency, on the CDU, will cause both localizer and glideslope receivers to tune to the appropriate paired frequencies.

  The transmitter radiates a field pattern, similar to the localizer transmitter, but with the radiate patterns above and below the glide path. The lower side of the course is modulated at 150 Hz. The upper side of the radiated pattern is modulated at 90 Hz. If the airplane strays above the glide path, into the 90 Hz zone, the PFDs will give a ‘fly down’ instruction. If the airplane strays below the glide path, into the 150 Hz zone, the PFDs will indicate a ‘fly up’ instruction.

  Any deviation, from the center of the glideslope beam, is shown on a vertical deviation scale, as two grey-dots either side of the center tick mark, in a ‘cut-out’ on the right side of the attitude display of the PFDs.

- Three Marker Beacons:

  Marker beacons (outer, middle and inner) are installed along the approach to the runway to provide accurate radio fixes. A marker beacon radiates directly upwards and uses a carrier frequency of 75 MHz.

  The marker beacon display is shown to the left of the pitch tape in the attitude ball on the PFDs.

  The outer marker (OM) is normally located between 4 to 7 miles from the airport and indicates a position at which the airplane, at the appropriate altitude on a localizer course, will intercept the glide path. The OM is modulated at 400 Hz. It is identified by a series of continuous dashes over the audio system, and a boxed cyan OM legend on the PFDs.

  The middle marker (MM), is located approximately 3,500 feet from the landing threshold on the centerline of the localizer course. The MM is modulated at 1300 Hz. It is identified by a series of alternate dots and dashes over the audio system, and a boxed yellow MM legend on the PFDs.

  The inner marker (IM), where installed, is located between the middle marker and the landing threshold, it indicates the point at which an airplane is at the decision height on the glide path during a Cat II ILS approach. The IM is modulated at 3000 Hz. It is identified by a series of continuous dots over the audio system, and a boxed white IM legend on the pilot’s PFDs.

  On the pilot’s and copilot’s audio control panels there are two PUSH ON/PUSH OFF MKR 1 and MKR 2 switches. The volume of the received marker beacon ident data is adjusted by the MKR 1 or MKR 2 rotary controls. The marker high or low sensitivity threshold is enabled according to decoded input tune data. The marker sensitivity can also be selected by pushing the Left Line Select Key 3 (L-LSK3) on the NAV CONTROL page of the FMS CDU.

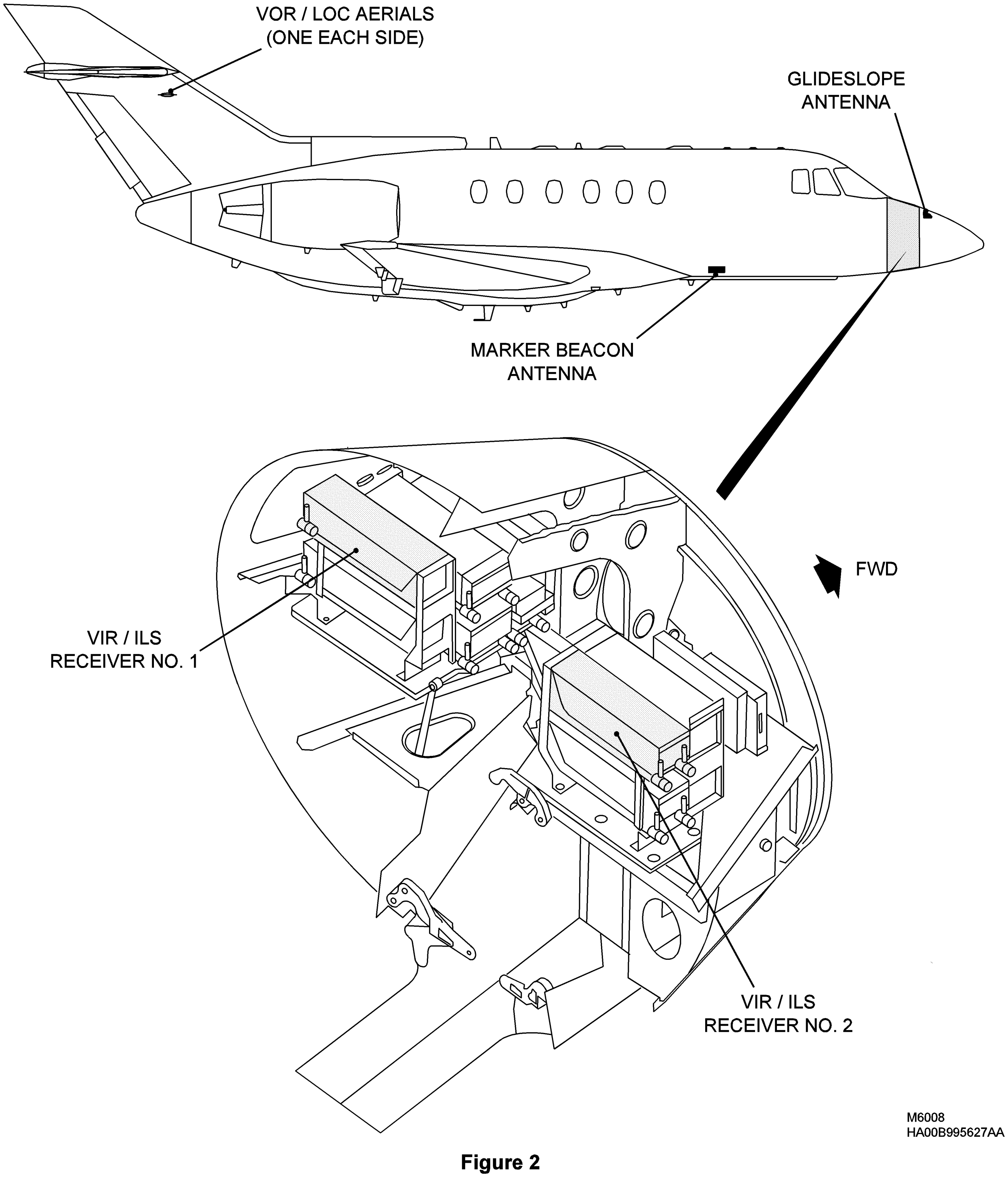


Figure 2
VOR/ILS Antenna and Receiver Locations

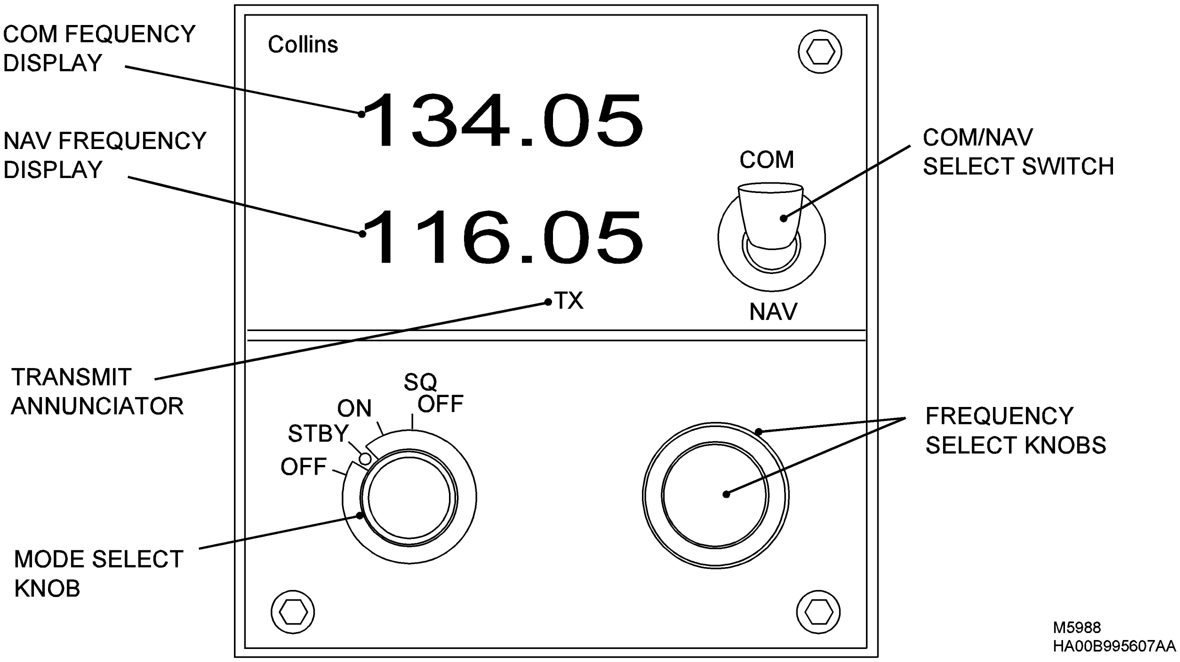


Figure 3
CTL-23C NAV/COM Control Unit

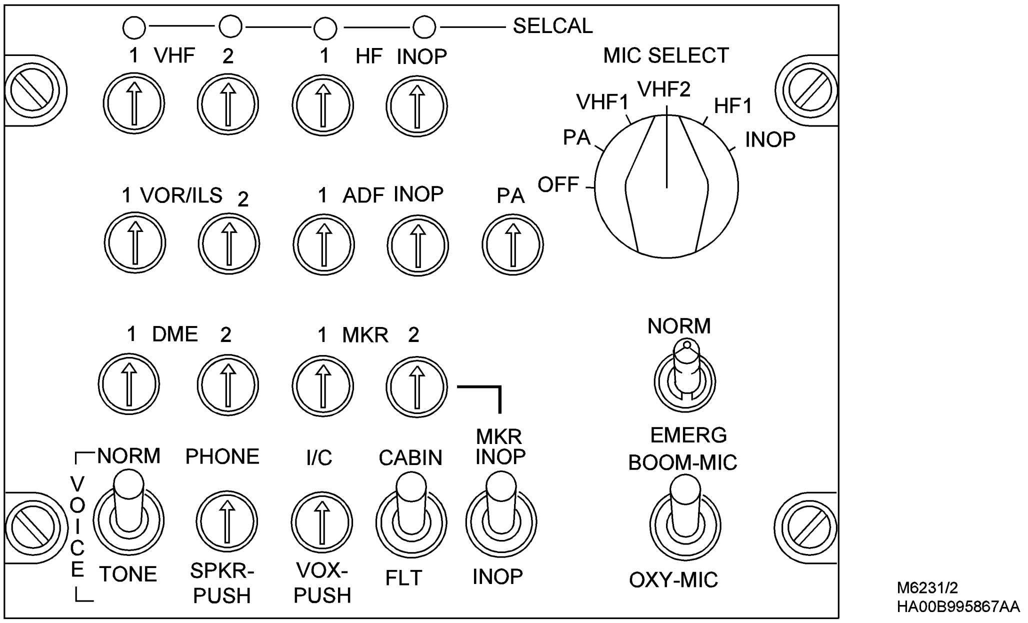


Figure 4
Pilot's Audio Control Panel - Airplanes Prior to Serial No.258670 (Typical)

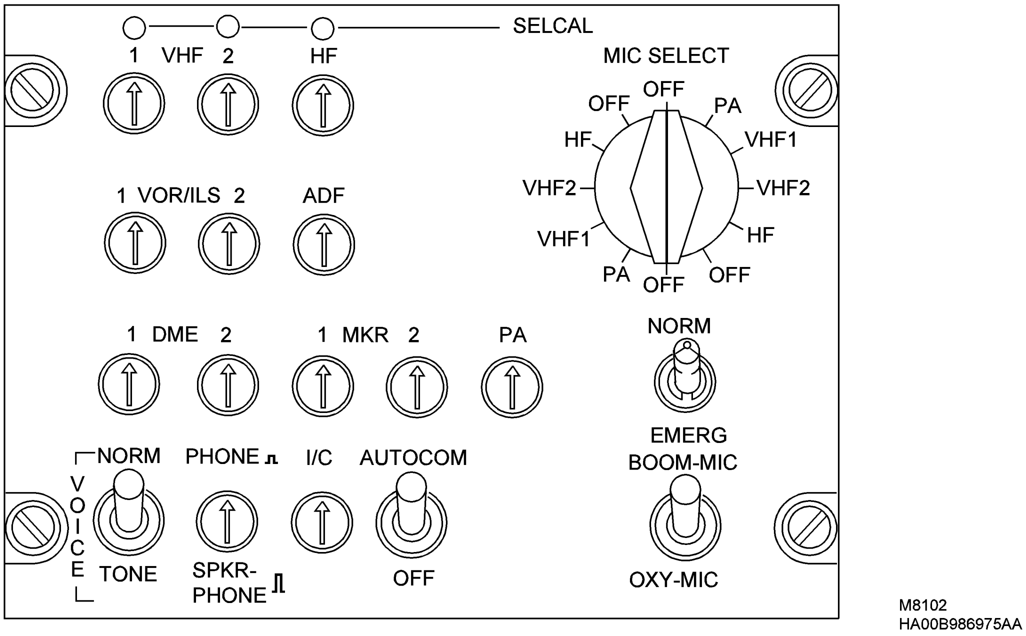


Figure 5
Pilot’s Audio Control Panel - Airplane Serial No. 258670 and Subsequent (Typical)

2. DESCRIPTION

The Collins VOR/ILS navigation (NAV) system is a combined VOR, ILS and Marker Beacon (MB) system. The VOR/ILS Nav System (VIR-432) is part of the Collins Radio Sensor System (RSS).

Control of the system is achieved through the two FMS CDUs. System information is shown on the primary flight display (PFDs).

There is a CDU reversion switch mounted on the bottom of the left and right instrument panels. When the switch is in the CDU position each CDU controls its own side system. If the switch is pushed to the REV position the cross-side CDU is switched OFF and the on-side CDU will control both the No. 1 and No. 2 systems.

If both the CDUs fail, the VIR-432 can be tuned from the CTL-23 COMM/NAV tuning unit (Ref. Figure 3).

VIR-432 Receiver (Ref. Figure 2)

The VIR-432 NAV Receivers are located in the nose avionics bay. The No. 1 (VIR-432) receiver is supplied with 28 Vd.c. from PE Bus through circuit breaker NAV 1 (panel DA-A) rated at 3 amps. The No. 2 (VIR-432) receiver is supplied with 28 Vd.c. from PS 2 Bus through circuit breaker NAV 2 (panel DA-A) rated at 3 amps

VHF NAV/LOC Antenna (Ref. Figure 2)

There are two VHF NAV/LOC (VOR/LOC) antennas. They are mounted in the tail fin, one each side. The antennas are both connected to the No. 1 and No. 2 VIR-432 receivers through two antenna couplers

Marker Beacon Antenna (Ref. Figure 2)

The marker beacon antenna is mounted on the right underside of the fuselage. The antenna is connected to both VIR receivers through a marker beacon coupler

Glideslope Antenna (Ref. Figure 2)

The glideslope antenna is mounted in the top of the nose section. The glideslope antenna is connected to the VIR receivers through a glideslope antenna coupler.

3. OPERATION

A. System Control

CDU-6200 Control Display Unit (Ref. Figure 6)

Under normal conditions the VOR/ILS (VIR-432) system is controlled from the FMS CDUs.

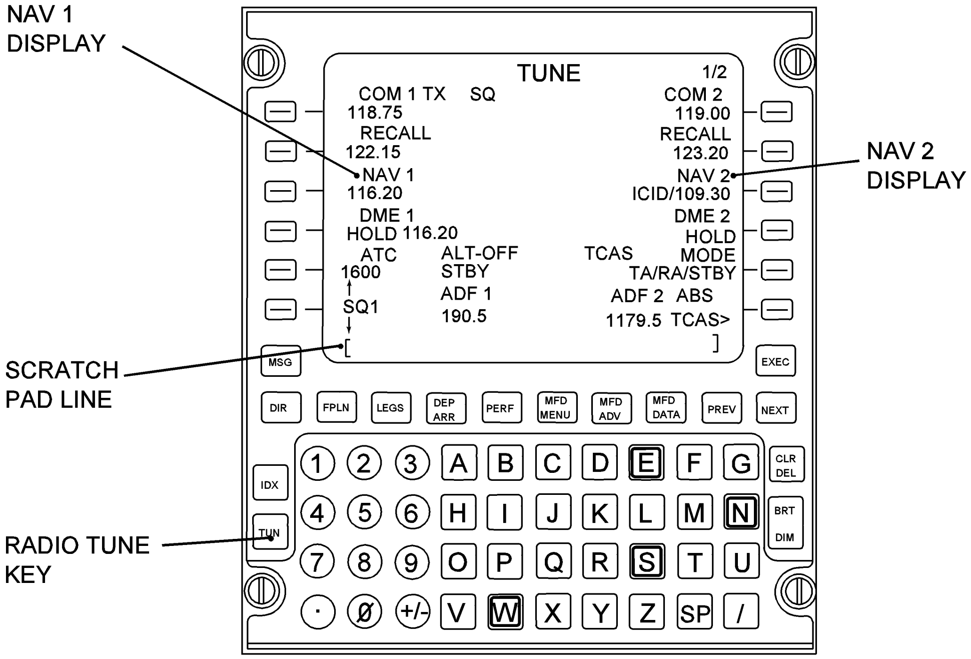
To tune a NAV radio, push the TUN button, on the CDU, to access the TUNE page. At the bottom of the TUNE page, enter the desired frequency, station identifier or preset number onto the scratchpad line - then push the NAV 1 (L3) line select key or the NAV 2 (R3) line select key to transfer this information to the selected field. If the information is valid, it shows (green) in the data field and the radio immediately retunes. To access the NAV CONTROL page, push the L3 or R3 line select key again. The NAV (VOR/ ILS) radios may be tuned from the CDU TUNE page or the NAV CONTROL page.

Active flight plan origin, destination or alternate airport localizer frequency may be tuned by the localizer identifier. The entry of a station identifier with more than one VOR, DME or localizer associated with it will cause a SELECT NAVAID page to appear which will show the possible stations unless one of the NAVAIDS is within 300 nautical miles of the FMS position. If the NAVAID is within 300 nautical miles, the frequency associated with that NAVAID is returned and the SELECT NAVAID page is not shown. The SELECT NAVAID page gives distinguishing information to let the pilot select the desired NAVAID. The possible NAVAIDS are arranged by increasing distance from the FMS position. If there are more than two possible NAVAIDS, the data is shown on subsequent SELECT NAVAID pages which are reached using the NEXT and PREV keys.

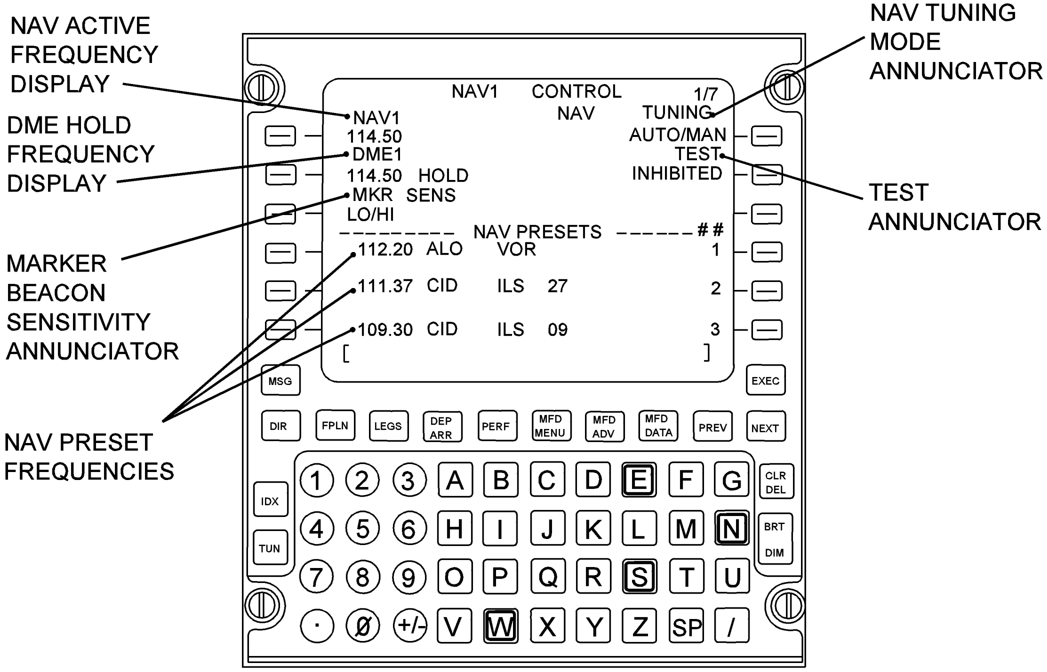
The NAV CONTROL screen annunciators, controls and displays are:

NAV Source Annunciator	...	If a NAV 1 source annunciation shows, it means that the CDU controls a No.1 (on-side) radio.
NAV Active Frequency Display	...	This display shows the active VHF NAV radio frequency. This is the active VIR (also DME, unless held) frequency. Enter the desired frequency, preset number or station identifier onto the scratchpad line. Then push the NAV line select key to transfer this frequency to the selected field. If the frequency is valid, it shows in the data field and the radio immediately retunes. The valid NAV frequency limits are 108 to 117.95 MHz or extended DME frequency range 108 to 117.95 MHz and 133 to 135.95 MHz. The NAV PRESETS numbers are 1 through 20.
DME Hold Line Select Key and Annunciator	...	Push the DME HOLD line select key [2L] and the NAV frequency associated with the current DME channel displays. HOLD annunciates by the held frequency.

Marker Beacon Sensitivity Line Select Key and Annunciator	...	Push the MKR SENS line select key [3L] to alternately select LO or HI marker beacon sensitivity. The larger, cyan annunciator marks the selection.
NAV TUNING Mode Annunciator	...	Push the NAV TUNING line select key [1R] to alternately select AUTO (automatic) or MAN tuning. The larger, cyan, annunciator marks the selection. The AUTO annunciation means the FMS is autotuning the NAV radios.
TEST Line Select Key and Annunciator	...	Push the TEST line select key [2R] to enable TEST for 10 seconds. The TEST annunciator enlarges, cyan, while the test is selected. If TEST INHIBIT shows, the line select key is inactive.
NAV PRESETS Display	...	The numbered NAV PRESETS display contains up to 20 preset NAV frequencies. Push the NEXT or PREV function key to select the next or previous preset page. Push the related line select key to transfer the numbered preset frequency to the NAV active frequency field. To create or modify a NAV PRESETS frequency, enter the desired frequency and/or identifier onto the scratchpad line - then push the associated numbered line select key to transfer this frequency to the numbered preset frequency field. If the frequency is valid, it shows in the data field.



RADIO TUNE PAGE



NAV 1 CONTROL PAGE

M6009/1
HA00B995628AA

Figure 6
FMS CDU - Tune/Control Pages

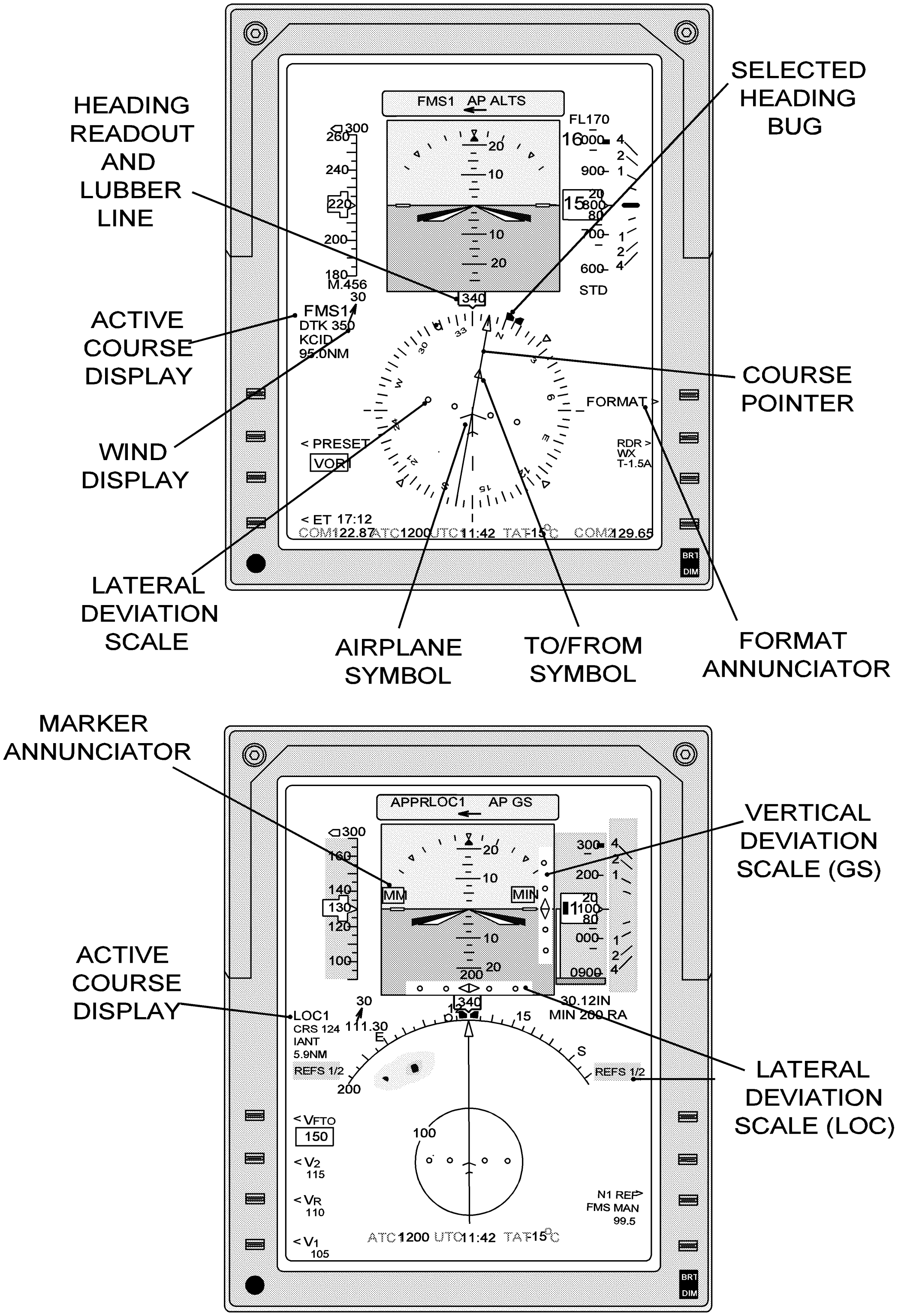


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Figure 7
PFD - Screen Displays

CTL-23 Tuning Unit (Ref. Figure 3)

A CTL-23 tuning unit, mounted on the right side console, is a backup tuning unit for the pilot side COM and NAV radios. The controls and displays, on the CTL, relevant to the VIR-432 are:

NAV/COM select switch	...	Place this switch to the NAV position. The NAV 1 can now be controlled from the Mode select knob and the Frequency knob.
Mode select knob	...	The Mode select knob must be turned to the appropriate position. OFF... The CTL is disabled and all control functions are inhibited. STBY... The STBY mode allows the CTL to display, but not control, the NAV frequencies. ON... The ON mode is enabled to control the NAV 1 radio. On the CDU, a NAV 1 REMOTE annunciation will show.
Frequency knob		The NAV frequency is made by turning the large or small concentric knob. The larger knob changes the most significant (left) digits. The smaller knob changes the two least significant (right) digits of the display. The normal NAV display frequency range is 108.00 to 117.95 MHz. The NAV radio spacing is 50 KHz.

The NAV active frequencies are displayed in orange when the CTL commanded frequency matches the echo feedback from the radio. The CTL uses a gas discharge display and will support only one color.

If the echo feedback from the radio is missing, frequency invalid, or the echo feedback does not match the commanded frequency, the bottom half of the first digit, of the active frequency will blink at approximately a 1 Hz rate.

B. Systems Displays

Primary Flight Displays (Ref. Figure 7)

The PFD displays the active NAV information on and beside the compass rose, arc or map. The pilots tune the appropriate NAV radio to the desired ground station or enters the flight plan, through the FMS CDU.

The pilot’s use the DCP’s NAV/BRG menu button and the PFD line select keys to select the NAV source.

The PFD screen annunciators, controls and displays, associated with lateral navigation and deviation, are:

Course Pointer	...	The course pointer is colored green if it receives data from an on-side source and yellow from a cross-side source.

To/From Indicator	...	The TO (s) and FROM (s) triangles form part of the course pointer and are the same color when the active NAV source is valid VOR or FMS.
Airplane Symbol	...	A white colored airplane in the center of the compass with nose towards the lubber line.
Lateral Deviation Bar	...	The center portion of the course pointer moves right or left of the airplane symbol to show the relative position of the course to the airplane. It moves an amount proportional to the magnitude of the deviation.
Lateral Deviation Scale on the Compass Display	...	A white scale perpendicular to the course pointer. It rotates with the course pointer, has scale markings of 2 white-dots left and 2 white-dots right of the course pointer compass center line.
Attitude Display - Lateral Deviation Scale	...	A scale of 2 grey-dots either side of the center tick. It appears as a ‘cut-out section’ on the bottom of the attitude display. The scale appears as a function of LOC as the active NAV source.
Attitude Display - Expanded Localizer Lateral Deviation Scale	...	A scale of 2 grey-square markings and a center diamond replaces the normal deviation four grey dots. The expanded scale appears when LOC is the active NAV source if the PFD CAT II discrete is enabled and a CAT II qualified LOC/GS receiver is installed.
Active NAV Source	...	The currently selected active NAV source of VOR 1, VOR 2, LOC 1, LOC 2, FMS 1 or FMS 2 is shown horizontally to the left of the compass rose.
Active NAV Source Frequency	...	When a LOC or VOR is selected as the active NAV source, the 5-digit NAV source frequency, with the decimal point, is shown to the right of the active NAV source annunciation.

For further information concerning the PFD refer to (Ref. 34-60-35, 001).

VOR/ILS (NAV) SYSTEM (COLLINS VIR-432) - REMOVAL/INSTALLATION

1. VOR/ILS (NAV) system

A. Preliminary procedures

(1) Open and safety tag the circuit breakers that follow (Chapter 24, ELECTRICAL POWER):

Panel	Label
DA-A	NAV 1
DA-A	NAV 2

(2) Make sure the airplane busbars are de-energized (Chapter 24, ELECTRICAL POWER).

(3) Open the nose avionics access doors (F171 and F 271) (Aircraft Flexible Maintenance Schedule), retain the attachment bolts.

B. VIR/ILS receiver - Removal

(1) Remove the lock wire and loosen the securing clamps; pull the unit straight out from the mount.

CAUTION: DO NOT LIFT THE RECEIVER UP OR MOVE IT FROM SIDE TO SIDE UNTIL THE REAR CONNECTOR IS CLEAR OF THE PANEL CONNECTOR.

(2) Remove the receiver from the mounting tray.

(3) Install protective caps or covers to the exposed electrical connections.

C. VIR/ILS receiver - Installation

(1) Remove the caps or covers from the electrical connections.

(2) Carefully push the unit squarely into the mount until the rear connectors are correctly mated. Engage and tighten the attachment clamps and wirelock.

(3) Remove the safety tag and close the circuit breakers opened in paragraph 1.A. (Chapter 24, ELECTRICAL POWER).

(4) Close and attach the nose avionics access doors (F171 and F271) (Chapter 06, PANEL LOCATION CHARTS), with the attachment bolts retained in paragraph 1.A.(3).

D. Adjustment/Test

(1) Do the test procedure for the VOR/ILS (NAV) system (ADJUSTMENT/TEST).

(2) Do an inspection/check of the nose avionics access doors (STATIC PLATES - INSPECTION/CHECK, paragraph 1.B. (1)).

E. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous items of equipment.

VOR/ILS (NAV) SYSTEM (COLLINS VIR-432) - ADJUSTMENT/TEST

1. Adjustment/test

A. Do a test of the VOR/ILS (NAV)

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual 523-0780107 Maintenance Section and do the test procedure for the No.1 or No. 2 VOR/ILS System as necessary.

NAVIGATION
LANDING AND TAXIING AIDS
VOR/ILS/ADF (NAV) SYSTEM (COLLINS NAV-4000/4500) DESCRIPTION AND OPERATION

1. INFORMATION (EFFECTIVITY: AIRPLANE SERIAL NO.258744 AND AFTER OR AIRPLANES WITH KITS AAC-0409 AND AAC-0410)

The VOR/ILS (NAV) System is contained in a Collins NAV-4500 Line Replaceable Unit (LRU).

The ADF function is combined with the VOR/ILS (NAV) System in a Collins NAV-4000 LRU. For details of the ADF system refer to AUTOMATIC DIRECTION FINDER (Ref. 34-50-15,1).

If two ADF system are installed the NAV-4500 LRU is replaced with a second NAV-4000 LRU.

2. GENERAL SYSTEM DESCRIPTION

The basic principle of operation for the VHF Omni-range (VOR) is that a VOR ground facility transmits two signals at the same time. One signal is constant, in all directions, while the other rotates about a point. The relationship between these two signals, when computed by the NAV-4000/4500 receiver, gives the airplane its radial position, in degrees, from that VOR station. Each VOR station also transmits a morse identification code. VOR ground stations are often co-located with DME ground stations (Ref. 34-50-05, 001) which makes it possible to pinpoint an airplanes distance from that ground station along the radial (Ref. Figure 1).

The lateral deviation bar, on the PFDs, moves left or right of the course pointer if the airplane strays from the course radial of the tuned VOR beacon.

The VOR/ILS system operates in the 108.00 to 117.95 MHz band with channels spaced at 50 kHz. There are 200 available channels.

The VOR system operates within the band 112.00 to 117.95 MHz and is intended for en-route navigation - it uses 120 of the available channels. The output power of a VOR station is enough to give a range of approximately 300 nautical miles.

There are VOR/ILS 1 and VOR/ILS 2 control switches on the pilot's and copilot's audio control panels. These switches control the audio level of the received transmissions from the VOR/ILS ground stations. The switches must be pulled-out and turned to control the volume.

Forty channels, in the 108.10 to 111.95 band, are allocated to the ILS localizer. The localizer beacon has a range of approximately 20 nautical miles.

The instrument landing system (ILS) is made up from three ground components as follows.

- Localizer Radio Transmitter:

  This provides an azimuth indication to guide the airplane to the end of the runway.

  The transmitter radiates a field pattern which develops a course down the centerline of the runway towards the middle and outer markers. The localizer provides course guidance throughout the descent path to the runway threshold. The radiated field pattern is modulated at two different frequencies. The right side of the pattern, along the normal approach path, is modulated at 150 Hz. The left side of the radiated pattern is modulated at 90 Hz. If the airplane strays into the left side, 90 Hz zone, the PFDs will give a 'fly right' instruction. If the airplane strays into the right side, 150 Hz, the PFDs will give a 'fly left' instruction.

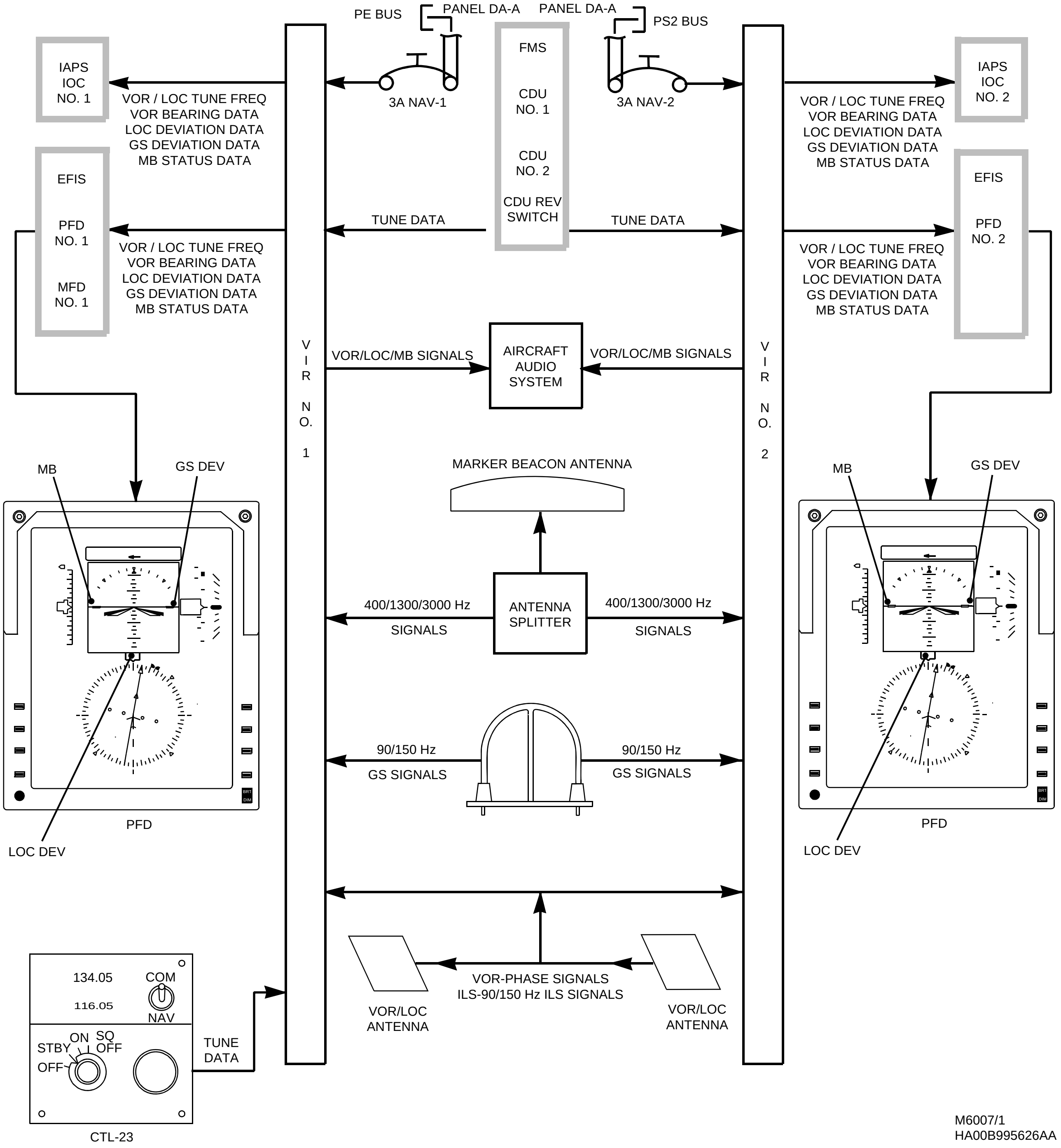


Figure 1
NAV-4000/4500 (VOR/ILS/MB) System

Any deviation, from the center of the localizer beam, is shown on a lateral deviation scale, located in a ‘cut-out’ section, at the bottom of the PFD attitude display. The scale is presented as two grey-dots either side of the center tickmark.

- Glideslope Radio Transmitter:

  This provides vertical guidance along the correct descent angle to the exact ‘touchdown’ point on the runway. The glideslope channels are in the UHF band, between 329.15 to 335.0 MHz. Each of the forty frequencies, allocated to the glideslope system, is paired with a localizer frequency. Pilot selection of the required localizer frequency, on the CDU, will cause both localizer and glideslope receivers to tune to the appropriate paired frequencies.

  The transmitter radiates a field pattern, similar to the localizer transmitter, but with the radiate patterns above and below the glide path. The lower side of the course is modulated at 150 Hz. The upper side of the radiated pattern is modulated at 90 Hz. If the airplane strays above the glide path, into the 90 Hz zone, the PFDs will give a ‘fly down’ instruction. If the airplane strays below the glide path, into the 150 Hz zone, the PFDs will indicate a ‘fly up’ instruction.

  Any deviation, from the center of the glideslope beam, is shown on a vertical deviation scale, as two grey-dots either side of the center tick mark, in a ‘cut-out’ on the right side of the attitude display of the PFDs.

- Three Marker Beacons:

  Marker beacons (outer, middle and inner) are installed along the approach to the runway to provide accurate radio fixes. A marker beacon radiates directly upwards and uses a carrier frequency of 75 MHz.

  The marker beacon display is shown to the left of the pitch tape in the attitude ball on the PFDs.

  The outer marker (OM) is normally located between 4 to 7 miles from the airport and indicates a position at which the airplane, at the appropriate altitude on a localizer course, will intercept the glide path. The OM is modulated at 400 Hz. It is identified by a series of continuous dashes over the audio system, and a boxed cyan OM legend on the PFDs.

  The middle marker (MM), is located approximately 3,500 feet from the landing threshold on the centerline of the localizer course. The MM is modulated at 1300 Hz. It is identified by a series of alternate dots and dashes over the audio system, and a boxed yellow MM legend on the PFDs.

  The inner marker (IM), where installed, is located between the middle marker and the landing threshold, it indicates the point at which an airplane is at the decision height on the glide path during a Cat ll ILS approach. The IM is modulated at 3000 Hz. It is identified by a series of continuous dots over the audio system, and a boxed white IM legend on the pilot’s PFDs.

  On the pilot’s and copilot’s audio control panels there are two PUSH ON/PUSH OFF MKR 1 and MKR 2 switches. The volume of the received marker beacon ident data is adjusted by the MKR 1 or MKR 2 rotary controls. The marker high or low sensitivity threshold is enabled according to decoded input tune data. The marker sensitivity can also be selected by pushing the Left Line Select Key 3 (L-LSK3) on the NAV CONTROL page of the FMS CDU.

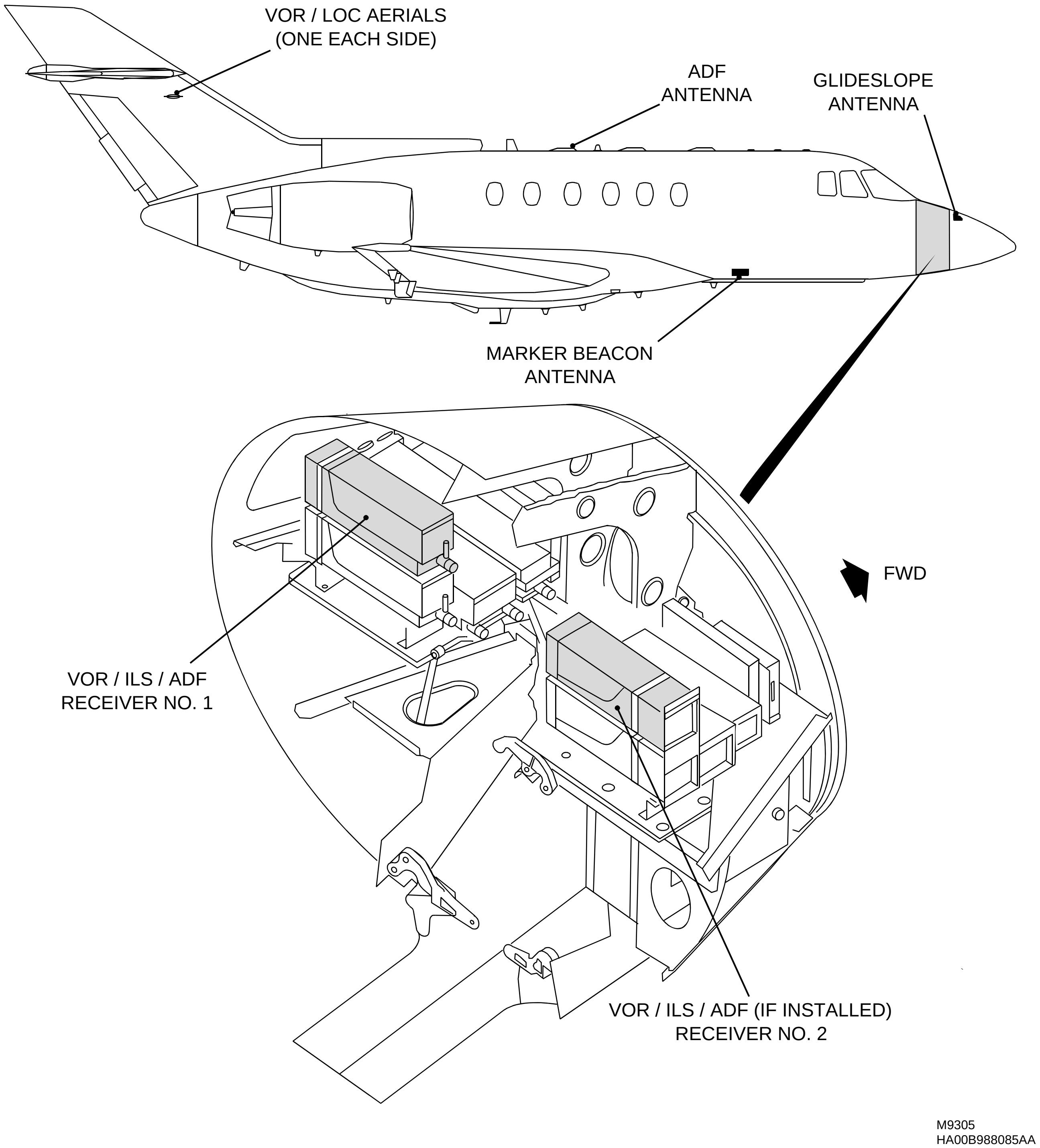


Figure 2
VOR/ILS Antenna and Receiver Locations

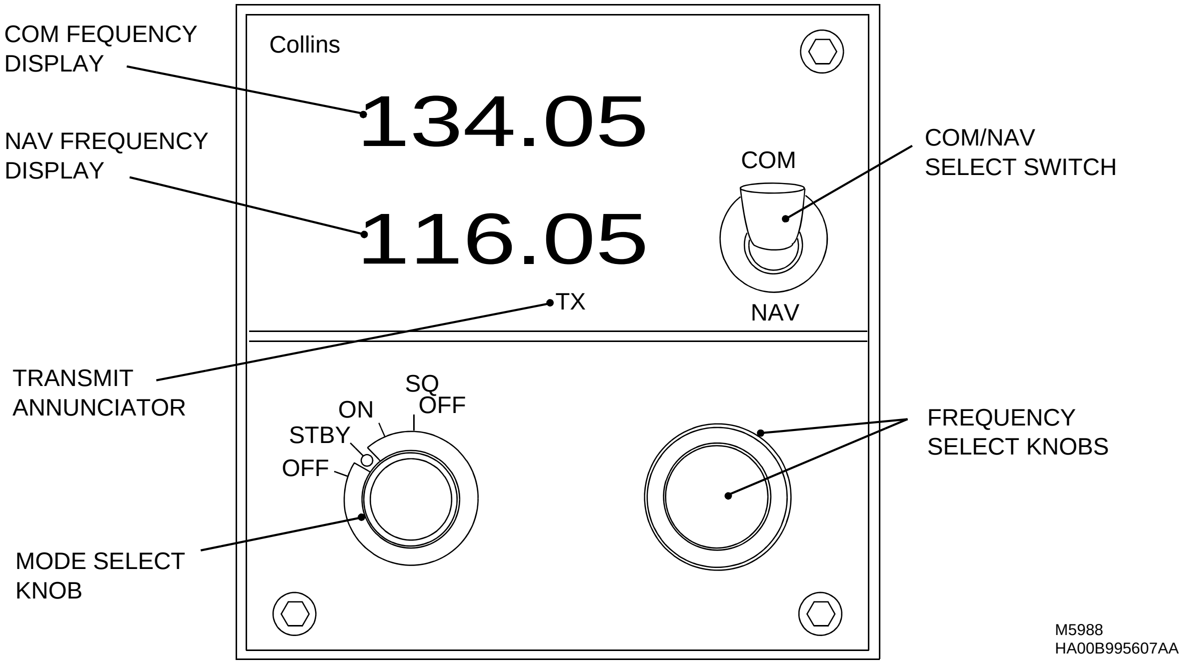


Figure 3
CTL-23C NAV/COM Control Unit

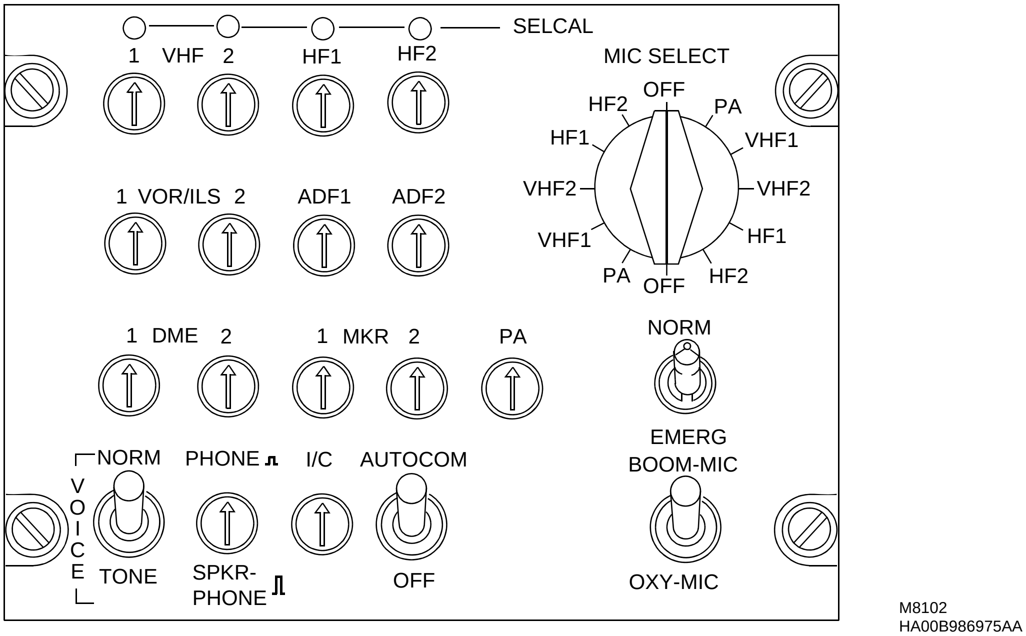


Figure 4
Pilot’s Audio Control Panel - (Typical)

3. AIRPLANE SYSTEM DESCRIPTION

The Collins VOR/ILS navigation (NAV) system is a combined VOR, ILS and Marker Beacon (MB) system. The VOR/ILS Nav System (NAV-4000/4500) is part of the Collins Radio Sensor System (RSS).

Control of the system is achieved through the two FMS CDUs. System information is shown on the primary flight display (PFDs).

There is a CDU reversion switch mounted on the bottom of the left and right instrument panels. When the switch is in the CDU position each CDU controls its own side system. If the switch is pushed to the REV position the cross-side CDU is switched OFF and the on-side CDU will control both the No. 1 and No. 2 systems.

If both the CDUs fail, the NAV-4000/4500 can be tuned from the CTL-23 COMM/NAV tuning unit (Ref. Figure 3).

NAV-4000/4500 Receiver (Ref. Figure 2)

The NAV-4000/4500 NAV Receivers are located in the nose avionics bay. The No. 1 (NAV-4000) receiver is supplied with 28 Vd.c. from PE Bus through circuit breaker NAV 1 (panel DA-A) rated at 3 amps. The No. 2 (NAV-4000/4500) receiver is supplied with 28 Vd.c. from PS 2 Bus through circuit breaker NAV 2 (panel DA-A) rated at 3 amps.

VHF NAV/LOC Antenna (Ref. Figure 2)

There are two VHF NAV/LOC (VOR/LOC) antennas. They are mounted in the tail fin, one each side. The antennas are both connected to the No. 1 NAV-4000 and No. 2 NAV-4000/4500 receivers through two antenna couplers.

Marker Beacon Antenna (Ref. Figure 2)

The marker beacon antenna is mounted on the right underside of the fuselage. The antenna is connected to both NAV receivers through a marker beacon splitter.

Glideslope Antenna (Ref. Figure 2)

The glideslope antenna is mounted in the top of the nose section. The glideslope antenna is connected to the NAV receivers through a glideslope antenna coupler.

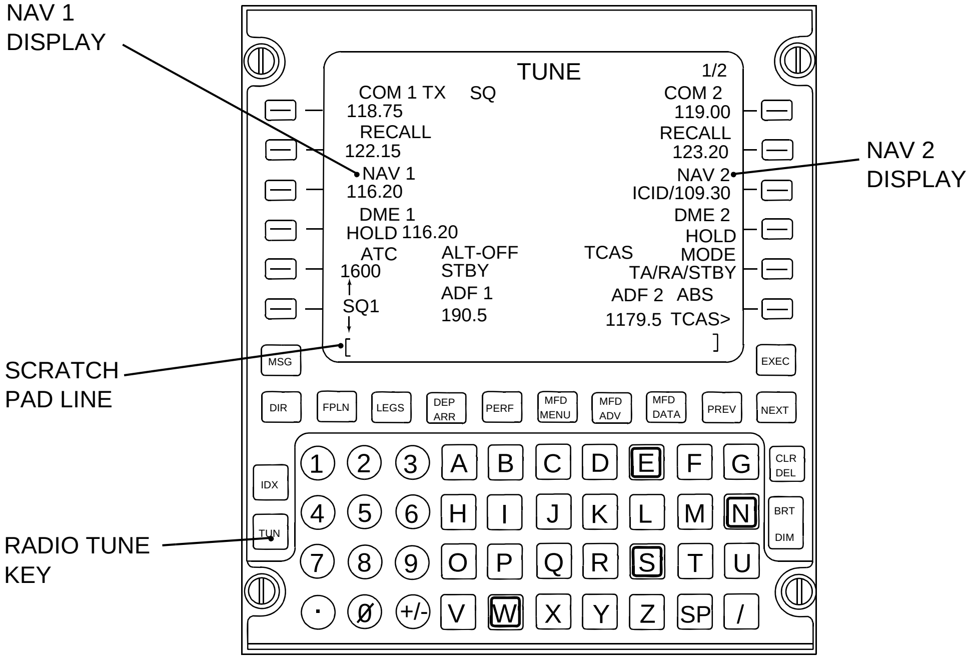
4. OPERATION

A. System Control

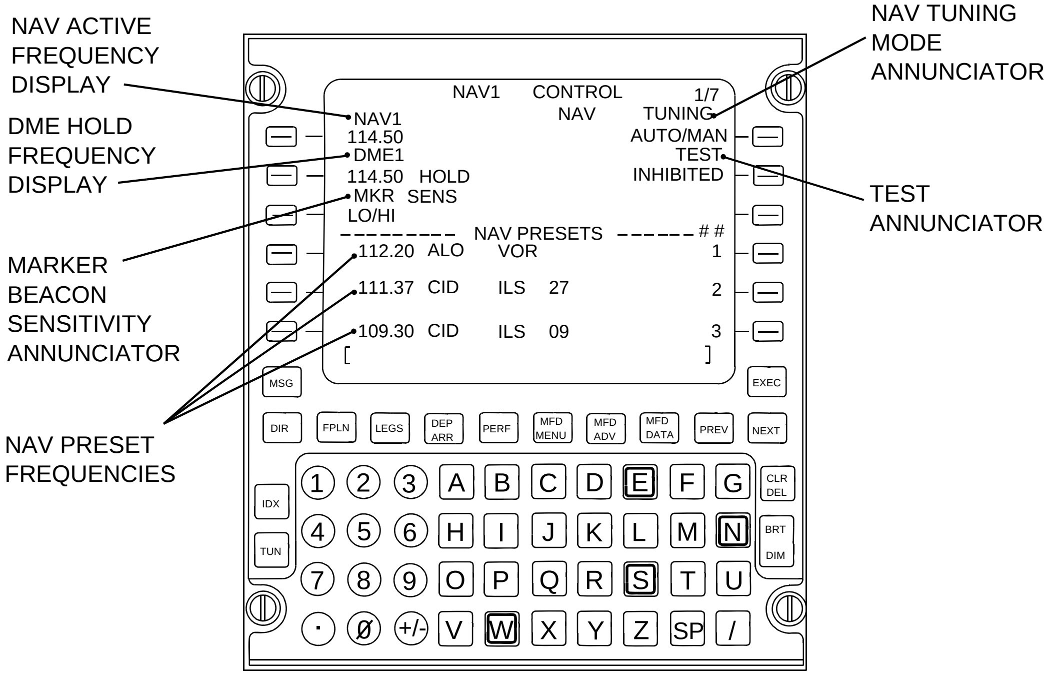
CDU-6200 Control Display Unit (Ref. Figure 6)

Under normal conditions the VOR/ILS (NAV-4000/4500) system is controlled from the FMS CDUs.

To tune a NAV radio, push the TUN button, on the CDU, to access the TUNE page. At the bottom of the TUNE page, enter the desired frequency, station identifier or preset number onto the scratchpad line - then push the NAV 1 (L3) line select key or the NAV 2 (R3) line select key to transfer this information to the selected field. If the information is valid, it shows (green) in the data field and the radio immediately retunes. To access the NAV CONTROL page, push the L3 or R3 line select key again. The NAV (VOR/ILS) radios may be tuned from the CDU TUNE page or the NAV CONTROL page.



RADIO TUNE PAGE



NAV 1 CONTROL PAGE

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Figure 5
FMS CDU - Tune/Control Pages

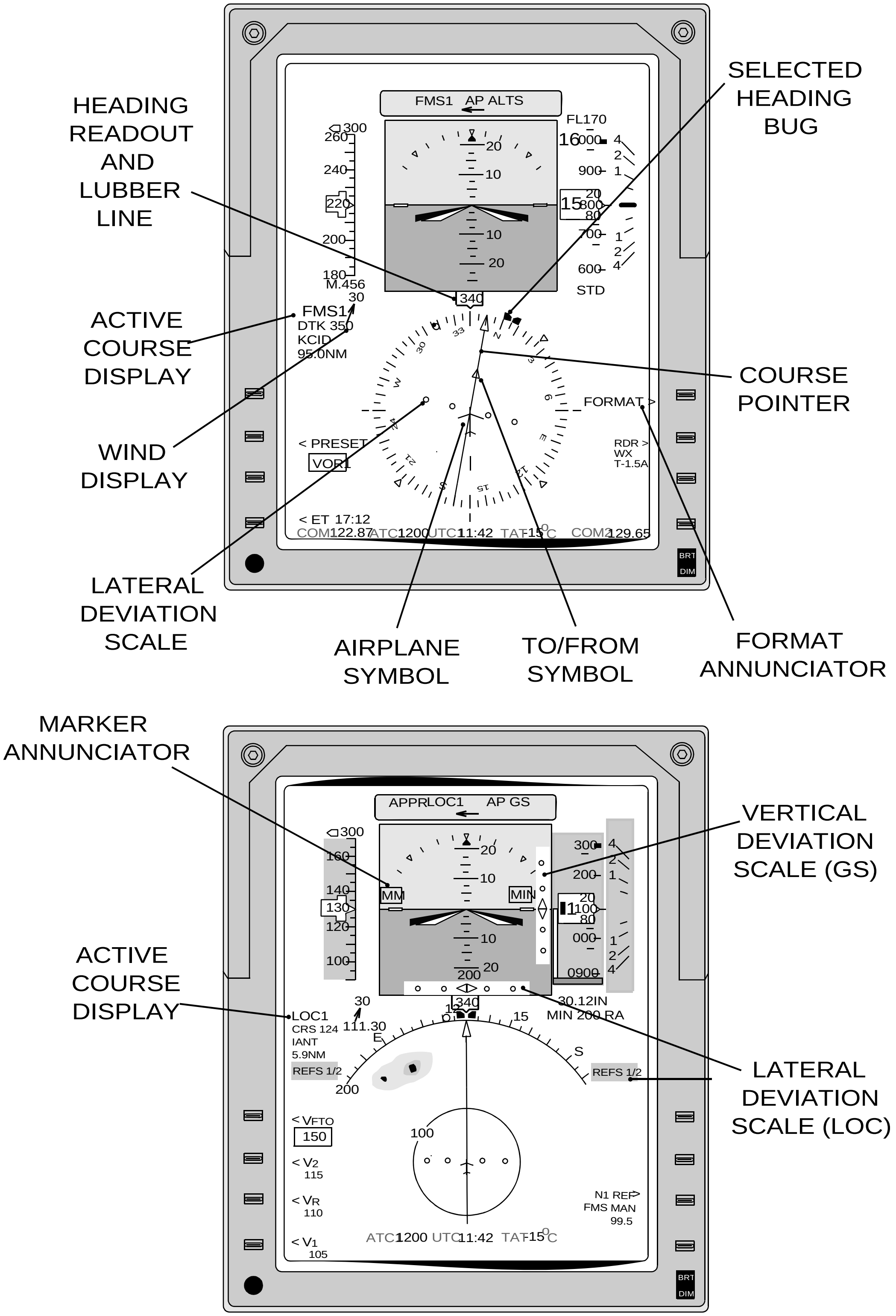


Figure 6
PFD - Screen Displays

Active flight plan origin, destination or alternate airport localizer frequency may be tuned by the localizer identifier. The entry of a station identifier with more than one VOR, DME or localizer associated with it will cause a SELECT NAVAID page to appear which will show the possible stations unless one of the NAVAIDS is within 300 nautical miles of the FMS position. If the NAVAID is within 300 nautical miles, the frequency associated with that NAVAID is returned and the SELECT NAVAID page is not shown. The SELECT NAVAID page gives distinguishing information to let the pilot select the desired NAVAID. The possible NAVAIDS are arranged by increasing distance from the FMS position. If there are more than two possible NAVAIDS, the data is shown on subsequent SELECT NAVAID pages which are reached using the NEXT and PREV keys.

The NAV CONTROL screen annunciators, controls and displays are:

NAV Source Annunciator	…	If a NAV 1 source annunciation shows, it means that the CDU controls a No.1 (on-side) radio.
NAV Active Frequency Display	…	This display shows the active VHF NAV radio frequency. This is the active NAV (also DME, unless held) frequency. Enter the desired frequency, preset number or station identifier onto the scratchpad line. Then push the NAV line select key to transfer this frequency to the selected field. If the frequency is valid, it shows in the data field and the radio immediately retunes. The valid NAV frequency limits are 108 to 117.95 MHz or extended DME frequency range 108 to 117.95 MHz and 133 to 135.95 MHz. The NAV PRESETS numbers are 1 through 20.
DME Hold Line Select Key and Annunciator	…	Push the DME HOLD line select key [2L] and the NAV frequency associated with the current DME channel displays. HOLD annunciates by the held frequency.
Marker Beacon Sensitivity Line Select Key and Annunciator	…	Push the MKR SENS line select key [3L] to alternately select LO or HI marker beacon sensitivity. The larger, cyan annunciator marks the selection.
NAV TUNING Mode Annunciator	…	Push the NAV TUNING line select key [1R] to alternately select AUTO (automatic) or MAN tuning. The larger, cyan, annunciator marks the selection. The AUTO annunciation means the FMS is autotuning the NAV radios.
TEST Line Select Key and Annunciator	…	Push the TEST line select key [2R] to enable TEST for 10 seconds. The TEST annunciator enlarges, cyan, while the test is selected. If TEST INHIBIT shows, the line select key is inactive.

NAV PRESETS Display	...	The numbered NAV PRESETS display contains up to 20 preset NAV frequencies. Push the NEXT or PREV function key to select the next or previous preset page. Push the related line select key to transfer the numbered preset frequency to the NAV active frequency field. To create or modify a NAV PRESETS frequency, enter the desired frequency and/or identifier onto the scratchpad line - then push the associated numbered line select key to transfer this frequency to the numbered preset frequency field. If the frequency is valid, it shows in the data field.

CTL-23 Tuning Unit (Ref. Figure 3)

A CTL-23 tuning unit, mounted on the right side console, is a backup tuning unit for the pilot side COM and NAV radios. The controls and displays, on the CTL, relevant to the NAV-4000/4500 are:

NAV/COM select switch	...	Place this switch to the NAV position. The NAV 1 can now be controlled from the Mode select knob and the Frequency knob.
Mode select knob	...	The Mode select knob must be turned to the appropriate position. OFF... The CTL is disabled and all control functions are inhibited. STBY... The STBY mode allows the CTL to display, but not control, the NAV frequencies. ON... The ON mode is enabled to control the NAV 1 radio. On the CDU, a NAV 1 REMOTE annunciation will show.
Frequency knob	...	The NAV frequency is made by turning the large or small concentric knob. The larger knob changes the most significant (left) digits. The smaller knob changes the two least significant (right) digits of the display. The normal NAV display frequency range is 108.00 to 117.95 MHz. The NAV radio spacing is 50 KHz.

The NAV active frequencies are displayed in orange when the CTL commanded frequency matches the echo feedback from the radio. The CTL uses a gas discharge display and will support only one color.

If the echo feedback from the radio is missing, frequency invalid, or the echo feedback does not match the commanded frequency, the bottom half of the first digit, of the active frequency will blink at approximately a 1 Hz rate.

B. Systems Displays

Primary Flight Displays (Ref. Figure 6)

The PFD displays the active NAV information on and beside the compass rose, arc or map. The pilots tune the appropriate NAV radio to the desired ground station or enters the flight plan, through the FMS CDU. The pilot's use the DCP NAV/BRG menu button and the PFD line select keys to select the NAV source.

The PFD screen annunciators, controls, displays, associated with lateral navigation and deviation, are:

Course Pointer	...	The course pointer is colored green if it receives data from an on-side source and yellow from a cross-side source.
To/From Indicator	...	The TO and FROM triangles form part of the course pointer and are the same color when the active NAV source is valid VOR or FMS.
Airplane Symbol	...	A white colored airplane in the center of the compass with nose towards the lubber line.
Lateral Deviation Bar	...	The center portion of the course pointer moves right or left of the airplane symbol to show the relative position of the course to the airplane. It moves an amount proportional to the magnitude of the deviation.
Lateral Deviation Scale on the Compass Display	...	A white scale perpendicular to the course pointer. It rotates with the course pointer, has scale markings of 2 white-dots left and 2 white-dots right of the course pointer compass center line.
Attitude Display - Lateral Deviation Scale	...	A scale of 2 grey-dots either side of the center tick. It appears as a 'cut-out section' on the bottom of the attitude display. The scale appears as a function of LOC as the active NAV source.
Attitude Display - Expanded Localizer Lateral Deviation Scale	...	A scale of 2 grey-square markings and a center diamond replaces the normal deviation four grey dots. The expanded scale appears when LOC is the active NAV source if the PFD CAT II discrete is enabled and a CAT II qualified LOC/GS receiver is installed.
Active NAV Source	...	The currently selected active NAV source of VOR 1, VOR 2, LOC 1, LOC 2, FMS 1 or FMS 2 is shown to the left of the compass rose.
Active NAV Source Frequency	...	When a LOC or VOR is selected as the active NAV source, the 5-digit NAV source frequency, with the decimal point, is shown to the right of the active NAV source annunciation.

For further information concerning the PFD refer to (Ref. 34-60-35, 001).

NAVIGATION
LANDING AND TAXIING AIDS
VOR/ILS/ADF (NAV) SYSTEM (COLLINS NAV-4000/4500) REMOVAL/INSTALLATION

1. INFORMATION (EFFECTIVITY: AIRPLANE SERIAL NO.258744 AND AFTER OR AIRPLANES WITH KITS AAC-0409 AND AAC-0410)

The VOR/ILS (NAV) System is contained in a Collins NAV-4500 Line Replaceable Unit (LRU).

The ADF function is combined with the VOR/ILS (NAV) System in a Collins NAV-4000 LRU. For details of the ADF system refer to AUTOMATIC DIRECTION FINDER (Ref. 34-50-20,1).

If two ADF systems are installed the NAV-4500 LRU is replaced with a second NAV-4000 LRU.

Material/Equipment	Item/Part No.
Wire, corrosion resistant	651 (Ref. AMM 125/H-20, 20-95-601)

A. Preliminary Procedures

(1) Open, safety clip and tag the circuit breakers that follow (Ref. 24-01-00, 201):

Panel	Label
DA-A	NAV 1
DA-A	NAV 2

(2) Open the nose gear doors (Ref. 32-20-42, 301).

(3) Make sure the airplane busbars are de-energized (Ref. 24-01-00, 201).

(4) Remove the nose wheel bay cover.

(5) Remove the hydraulic cover.

2. NAV-4000/4500 RECEIVER

A. Removal

	MECH	INSP
(1) Do the preliminary procedures, paragraph 1.A.		
CAUTION *Do not lift the receiver up or move it from side to side until the rear connector is clear of the panel connector.*		
(2) Cut and remove the lock wire and loosen the securing clamp; pull the unit straight out from the mount.		

	MECH	INSP
(3) Remove the receiver from the mounting tray.		
(4) Install protective caps or covers to the exposed electrical connections.		

B. Installation

	MECH	INSP
(1) Remove the caps or covers from the electrical connections.		
(2) Carefully push the unit squarely into the mount until the rear connectors are correctly mated.		
(3) Engage and tighten the attachment clamps and lock wire (Item 651).		
(4) Remove the safety clip and tag, and close the circuit breakers opened in paragraph 1.A. (Ref. 24-01-00, 201).		
(5) Install the hydraulic cover.		
(6) Install the nose wheel bay cover.		
(7) Close the nose gear doors (Ref. 32-20-42, 301).		
(8) Do the test procedure for the VOR/ILS (NAV) system (Ref. 34-32-30, 501).		

C. Close Up

(1) Make sure the work area is clean and clear of tools and other items of equipment.

NAVIGATION
LANDING TAXIING AIDS
VOR/ILS/ADF (NAV) SYSTEM (COLLINS NAV-4000/4500)
ADJUSTMENT/TEST

1. INFORMATION
(EFFECTIVITY: AIRPLANE SERIAL NO. 258744 AND AFTER OR AIRPLANES WITH KITS AAC-0409 AND AAC-0410)

2. ADJUSTMENT/TEST

A. VOR/ILS Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the No.1 or No.2 VOR/ILS system as necessary.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the No.1 or No.2 VOR/ILS system as necessary.

NAVIGATION
LANDING AND TAXIING AIDS
VOR/LOC AERIAL
REMOVAL/INSTALLATION

1. INFORMATION

Equipment/Material	**Part/Item No.**
Polysulfide Sealant	316 (Ref. AMM 125/H-20, 20-95-301)
Cleaner, solvent	201 (Ref. AMM 125/H-20, 20-95-201)
Aluminum Wool	Local Supply

2. VOR/LOC AERIAL

A. Removal

	MECH	**INSP**
(1) On panel DA-A open, safety clip and tag the circuit breaker NAV1 & MKR or NAV2, as applicable (Ref. 24-01-00, 201).		
(2) Get access to the VOR/LOC aerial installation on the fin structure.		
(3) Remove the four mushroom-head bolts which attach the aerial to the mounting blocks, record the orientation and withdraw the aerial to the extent permitted by the connecting cable.		
(4) Disconnect the co-axial cable connector from the aerial.		
(5) Seal the plug and socket with an approved cap and cover.		

B. Installation

	MECH	**INSP**
(1) Remove and clean off the unwanted sealing compound from the aerial footprint on the fin skin using solvent cleaner (Item 201).		
(2) Prepare the aerial and mounting blocks (Ref. AMM 125/H-20, 20-10-5016, method 9). Make sure that the gasket on the aerial base is serviceable.		
(3) Remove the cap and cover from the plug and socket.		
(4) Connect the co-axial cable to the connector to the aerial socket.		
(5) Carefully position the aerial on the mounting blocks with orientation as recorded in paragraph 2.A. (3) and attach with the four mushroom-head bolts.		

	MECH	INSP
(6) Seal the voids under the aerial base gasket, leaving a neat fillet around the base periphery, and the tops of the attaching bolts with polysulphide sealant (Item 316) (Ref. AMM 125/H-20, 20-10-447).		
(7) On panel DA-A, remove the safety clip and tag and close the circuit breaker opened in paragraph 2.A. (1) (Ref. 24-01-00, 201).		
(8) Do a functional test of the VOR/ILS system (Ref. 34-32-29, 501 or 34-32-30, 501).		

C. Close Up

	MECH	INSP
(1) Make sure the work area is clean and clear of tools and other equipment.		

RADIO ALTIMETER (COLLINS ALT-4000) - DESCRIPTION AND OPERATION

1. Introduction

The ALT-4000 Radio Altimeter supplies the pilot with altitude information during the approach phase of the flight.

2. Description *(Figure 2)*

The ALT-4000 Transmitter/Receiver (T/R) supplies a signal to the transmit antenna. The transmit antenna sends the signal to the terrain and the terrain reflects the signal back to the receive antenna. The return signal is applied to the receiver section of the T/R. The altitude of the airplane, above the terrain, is proportional to the time required for the transmit signal to make the round trip to the terrain and back to the radio altimeter system. The signal is continuous and, within the 2,500 feet maximum range of the altimeter, gives constant altitude information which is shown on the Primary Flight Display (PFD).

The ALT-4000 outputs its altitude data to the No.1 Input/Output Concentrator (IOC) in the Integrated Avionics Processor System (IAPS), the TCAS TTR and the EGPWS. Up to four RAD ALT trip switches can be programmed to provide outputs to optional airplane systems.

3. Operation *(Figure 1, Figure 2)*

A. Radio Altitude Display

The radio altimeter system (ALT-4000) is supplied with 28 volts DC from the PS1 busbar.

A digital read-out of radio altitude is shown in the lower part of the attitude display. This read-out shows the airplanes above level ground (AGL) altitude when the airplane is within 2500 feet of the ground.

The radio altitude is presented as a 4 digit read-out and is haloed green unless the RA alert is in view, then the radio altitude is haloed amber. When the radio altitude is shown, it overwrites all of the ADI displays beneath it.

If the radio altitude data becomes invalid, the digital read-out of the radio altitude is removed and replaced by a red, boxed RA flag that flashes for 5 seconds, and is then steady.

B. RA - Decision Height

The RA MIN function alerts the pilot that the airplane has descended to the selected RA decision height. RA MIN is a function of radio altimeter altitude and is therefore the AGL altitude. If selected to ON, the RA MIN read-out comes into view, below the barometric altitude scale, at/or below 2,500 feet. When at the point where radio altitude is equal to, or below, the RA MIN set value, a yellow MIN alert, to the right of the pitch scale, is shown, flashes for 5 seconds and then shows steady.

The RA MIN values are controlled from the references (REFS) menu. The REFS menu is activated by pushing the REFS button on the display control panel (DCP). The RA MIN setting is then displayed next to the line select key R1. To adjust the RA MIN value, push the related line select key - the digits enlarge and are colored cyan. The value can now be changed by turning the MENU SET knob on the DCP. A RA MIN setting is temporarily, below the barometric altitude scale, which replicates the changes. The RA MIN range is 5 to 999 feet.

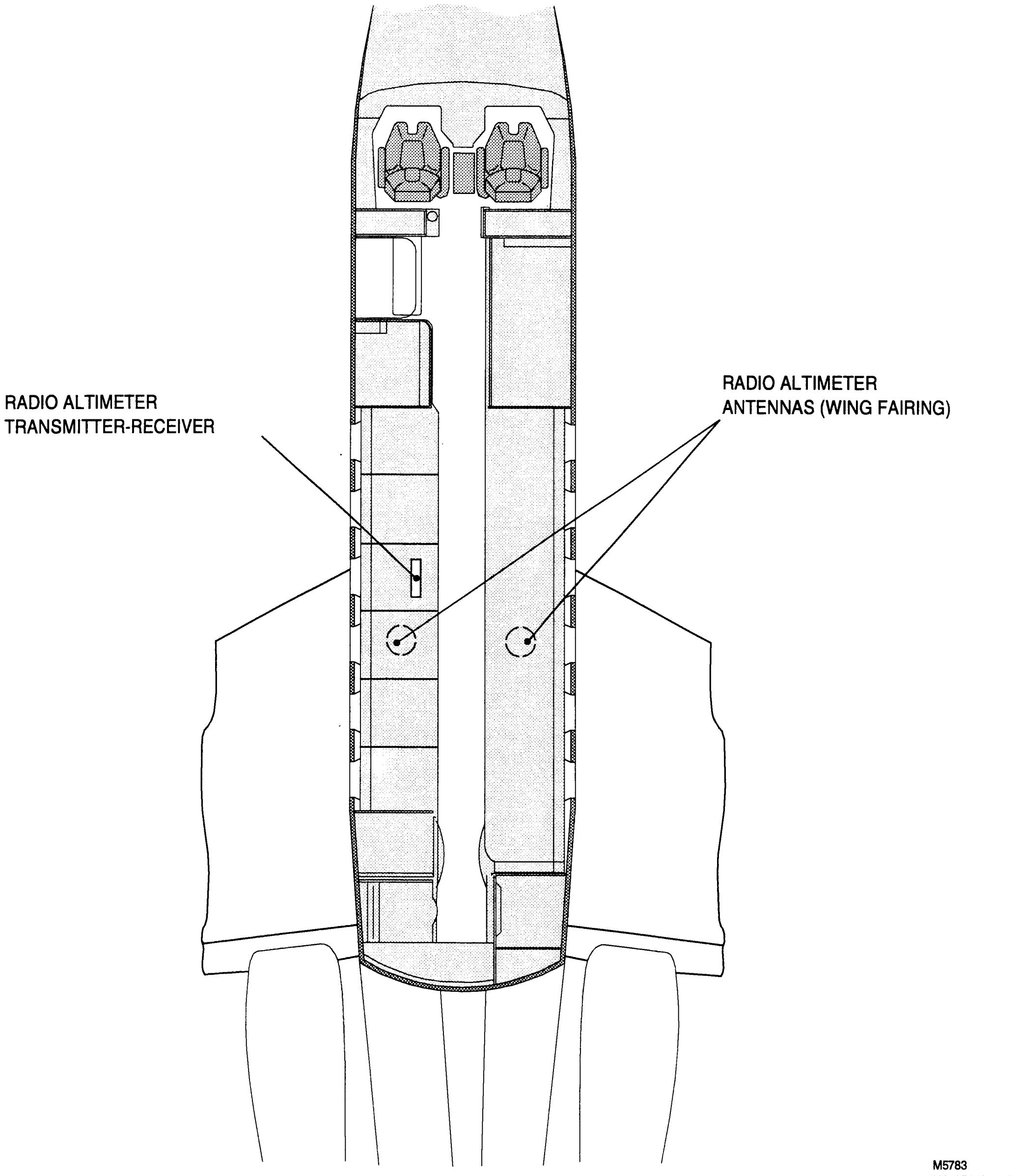
C. Components *(Figure 1)*

ALT-4000 Transceiver

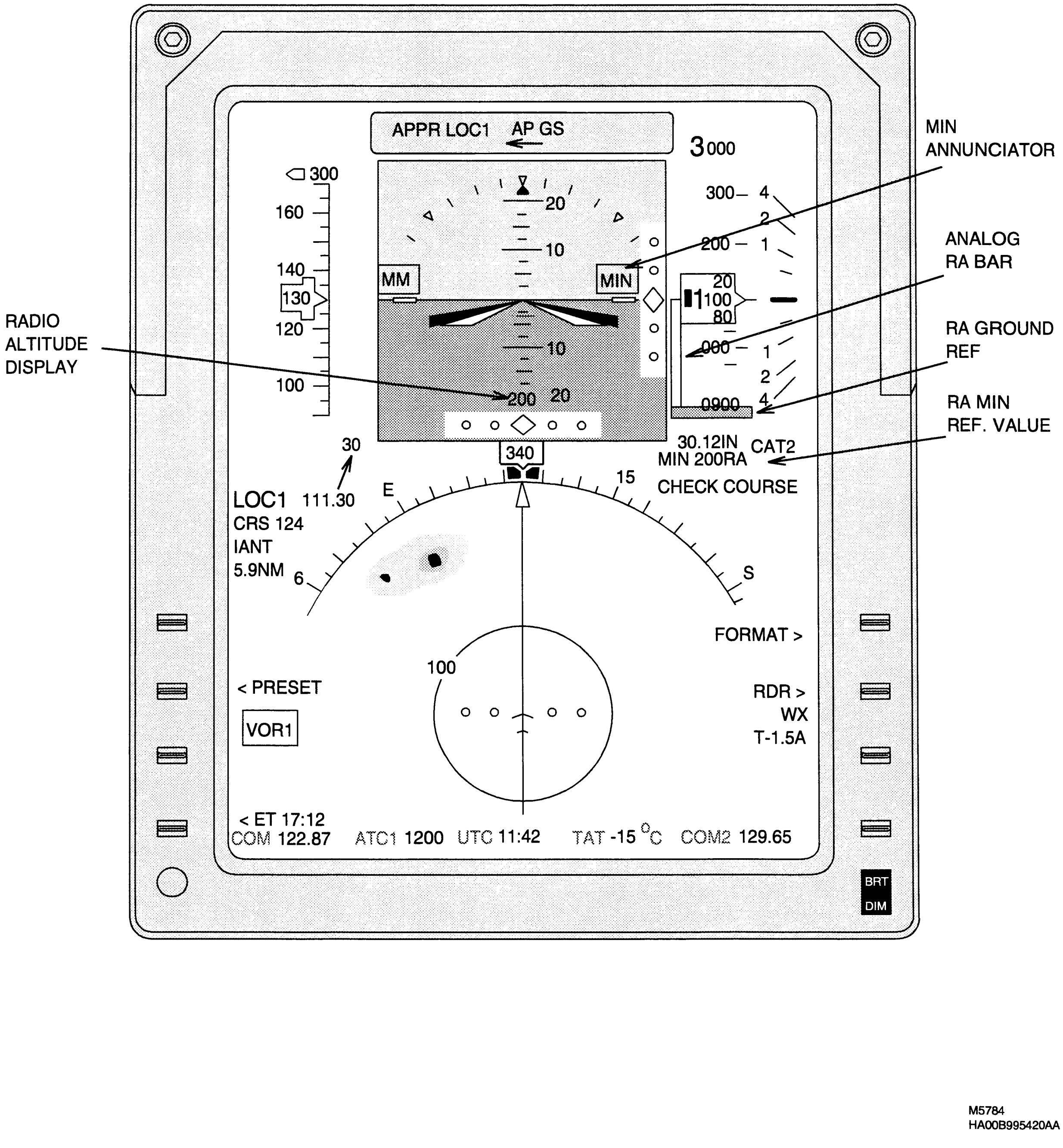
The ALT-4000 transceiver is a rack mounted unit located underfloor midway on the left side of the fuselage.

Antennas - Transmitter and Receiver

The antennas are both mounted on the underside of the fuselage.



Radio Altimeter components - Location
Figure 1



Digital readout of the Radio Altimeter
Figure 2

RADIO ALTIMETER (COLLINS ALT-4000) - REMOVAL/INSTALLATION

1. Radio altimeter system

A. Preliminary Procedures

(1) Open and safety tag the circuit breaker that follows (Chapter 24, ELECTRICAL POWER).

Panel	Label
DA-A	RAD ALT

(2) Make sure the airplane busbars are de-energised (Chapter 24, ELECTRICAL POWER).

2. Transceiver

A. Removal

(1) Remove the left side floor covering and access panel between frames 12 and 13.

CAUTION: DO NOT LIFT THE TRANSCEIVER UP, OR MOVE IT FROM SIDE TO SIDE UNTIL THE REAR CONNECTORS ARE COMPLETELY DISENGAGED. THIS IS TO PREVENT DAMAGE TO THE CONNECTOR PINS.

(2) Cut and remove the locking wire and loosen the attachment clamps; pull the unit straight out from the mount.

(3) Install protective caps and covers to the electrical connectors.

B. Installation

(1) Remove the protective caps and covers from the electrical connectors.

(2) Carefully push the unit squarely into the mount until the rear connectors are correctly mated. Engage and tighten the attachment clamps and wirelock.

(3) Install the access panel and floor covering removed at paragraph 2.A.(1).

(4) Remove the safety tag and close the circuit breakers listed in 1.A. (Chapter 24, ELECTRICAL POWER).

(5) Do a functional test of the radio altimeter system (ADJUSTMENT/TEST).

C. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous equipment.

3. Antenna

A. Removal

(1) Open and safety tag the circuit breaker that follows (Chapter 24, ELECTRICAL POWER).

Panel	Label
DA-A	RAD ALT

CAUTION: MAKE SURE THE DOOR IS SUPPORTED BY ITS RETAINING CORDS, NOT BY THE ANTENNA CABLE.

(2) Hinge down the appropriate access door.

(3) Disconnect the co-axial connector from the antenna.

(4) Remove and retain the antenna attachment bolts and remove the antenna.

B. Installation

Equipment/Materials	Part/Item No.
Polysulphide Polymer	313 (Chapter 20-95-301)
Cleaner, solvent (MPK)	201 (Chapter 20-95-201)
Aluminum wool	Local supply

(1) Clean the mating surfaces do the antenna and mounting position on the door. Use aluminium wool and cleaner solvent (item 201) to remove old sealant.

(2) Install the antenna to the access door with the attachment bolts retained at paragraph 2.A.(4).

(3) Seal the edge of mating surfaces with Polysulphide Polymer (Item 313) (Chapter 20 SEALING OF PRESSURE CABINS).

(4) Attach the co-axial connector to the antenna.

(5) Close the access door opened in paragraph 2.A.(2).

(6) Remove the safety tag and close the circuit breaker listed in 1.A. (Chapter 24, ELECTRICAL POWER).

(7) Do a functional test of the radio altimeter system (ADJUSTMENT/TEST).

C. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous equipment.

NAVIGATION
INDEPENDENT POSITION DETERMINING
RADIO ALTIMETER (COLLINS ALT-4000)
ADJUSTMENT/TEST

1. RADIO ALTIMETER

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the radio altimeter.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the radio altimeter.

NOTE: The 800XP does not have a RA TEST button, therefore the 50 foot Radio Altimeter test and fault finding procedures are not applicable.

WEATHER RADAR SYSTEM (COLLINS RTA-858) - DESCRIPTION AND OPERATION

1. Description

A. General

The weather radar (WXR) system gives weather and turbulence avoidance data along the flight path to a maximum range of 300 nautical miles. The WXR can also be used to give ground terrain data.

The WXR system has the units that follow:

- One Weather Radar Receiver/Transmitter/Antenna (RTA) Unit.

The units that follow are part of the Electronic Flight Instrument System (EFIS), but have WXR functions:

- Two Display Control Panels (DCPs).
- Two Primary Flight Displays (PFDs).
- Two Multifunction Displays (MFDs).

The weather and map data can be overlaid on either or both PFDs and MFDs on most of the navigation display formats. Refer to *Figure 1* for a typical weather display overlaid on the MFD Map display.

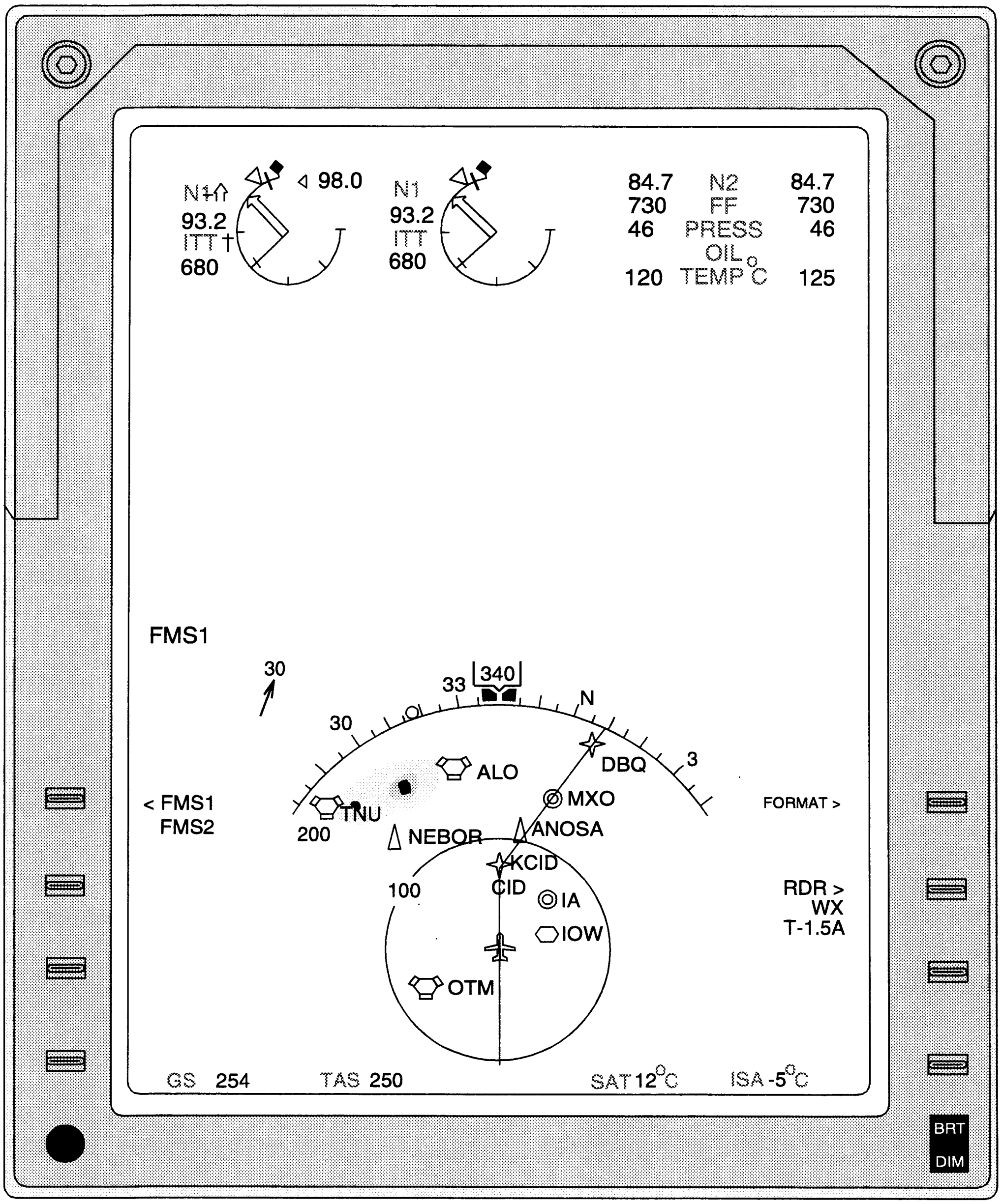
Control of the WXR is through a combination of switches on the DCP and the line select keys on the MFDs/PFDs.

With two PFDs and/or MFDs operational, the radar operates like two independent radars. Each pilot's display is controlled by the onside DCP/PFD and is updated on each second sweep of the antenna.

The PFDs and MFDs contain the RDR line select key to select and deselect the radar display.

Storm intensity levels and turbulent areas are shown in bright colors against a black background. Rainfall intensity is shown in four colors: green, yellow, red and magenta. Magenta shows rainfall of two inches per hour or greater. Turbulence is also shown in magenta. A Ground Clutter Suppression (GCS) feature decreases the display of unwanted ground returns when it operates in the weather (WX) mode. In the ground mapping (MAP) mode, prominent landmarks and ground contours are shown in cyan, green, yellow and magenta. Magenta shows the most reflective targets.

The WXR system has Path Attenuation Correction (PAC) to compensate for the radar beam absorption as it goes through a given precipitation cell. This overcomes the tendency in an uncompensated radar to not show the true image of a precipitation cell because the energy is absorbed as it goes through the cell. When the full range of attenuation correction is used up, an extremely low or nil signal return in such conditions will cause a PAC Alert. A PAC Alert shows areas of unknown rainfall rates caused by radar beam absorption by intervening areas of precipitation, and thus warns of possible, hidden, severe weather ahead. The bearing to these areas is shown by a yellow PAC Alert bar at the perimeter of the radar display.



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MFD Map with Weather Display
Figure 1

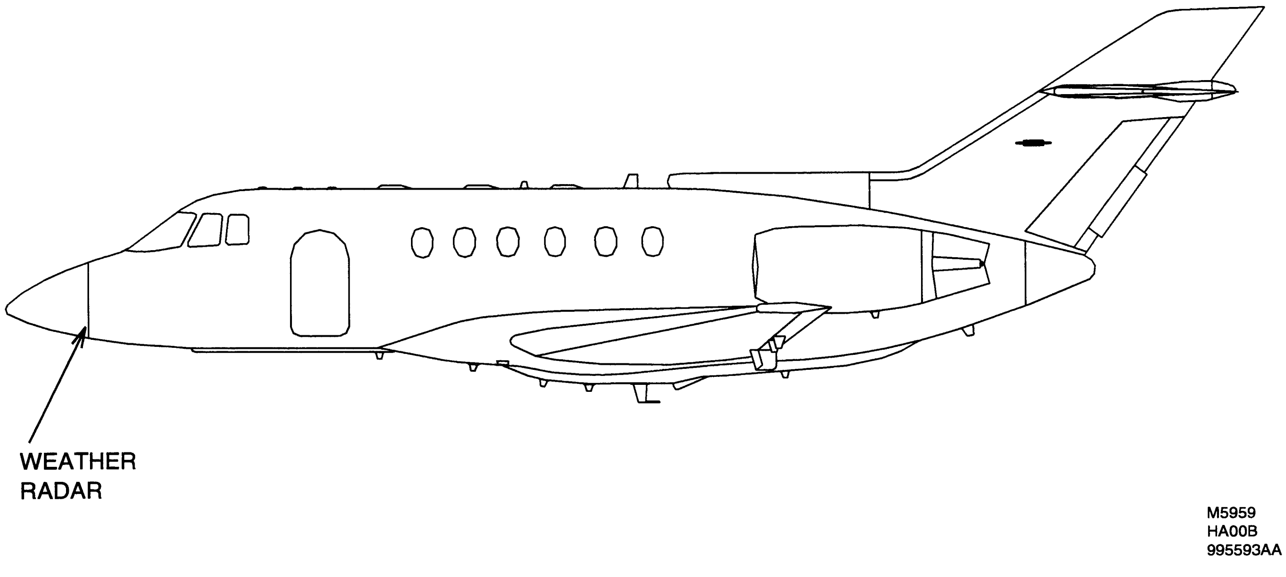
B. Receiver/transmitter/antenna

The RTA-858 integrates transmitter, receiver and antenna functions into a single RTA unit. The 18-inch planar array has the transmitter and receiver components attached to the rear of it, with the interface and processor circuitry installed in the base. For the location of the RTA, refer to *Figure 2.*

The antenna is a stabilized 120-degree sector scanning unit, mechanically operated in azimuth and tilt by the motors and gears of the tilt and scan mechanism, which is part of the drive assembly. The antenna may be tilted up or down by 16 degrees. Tilt may be controlled manually or automatically; in automatic mode, the manual tilt control provides a trim capability around the automatically maintained position.

The antenna stabilization components keep the antenna beam at a constant line-of-sight with respect to the horizon, biased by the selected tilt angle and regardless of airplane attitude, within the limits of ±30 degree antenna elevation excursions. These components are controlled by the stabilization circuitry of the processor which receives pitch and roll data from the airplane attitude heading computer.

An internally-sensed altitude signal is used for automatic adjustment of the antenna tilt control, within the selected range. Combined pitch and roll antenna stabilization plus the tilt angle is functional over the range of ±30 degrees.



Receiver/Transmitter/Antenna Location
Figure 2

The RTA supplies, radiates and receives X-band radio frequency energy for the weather and turbulence detection and ground mapping functions. The 9343 MHz transmitted signals are sent directly to the antenna from the transmitter circuitry attached to the rear of the antenna. Nominal transmitter output power is 24 watts. Echo signals received by the antenna are applied directly to the receiver which is attached to the antenna. The IF, video and processing system encodes these signals into one of the categories that follow:

- Four levels of rainfall, calculated from the intensity of the returns.
- Four levels of ground return, calculated from the intensity of the returns.
- A turbulence level, calculated from the frequency shift related to the raindrop relative velocity.

The processing circuitry scan converts this data and outputs it as refreshed video signals for display on the PFDs/MFDs.

C. Display Control Panel (DCP)

Control of the WXR is through a combination of switches on the DCP and the line select keys on the MFDs/PFDs.

Each DCP has the switches that follow to control the WXR:

- A RADAR pushbutton to select and deselect the RADAR menu on the PFDs.
- A MENU ADV rotary switch and a PUSH MENU SET pushbutton to move to, change and select the different RADAR menu items.
- A dual concentric rotary switch (TILT/RANGE) and a PUSH AUTO TILT pushbutton to control radar antenna tilt and range.
- A Ground Clutter Suppression (GCS) pushbutton. When GCS is active, ground clutter returns are suppressed, which makes the interpretation of rainfall easier.

D. Primary Flight Displays (PFD) and Multifunction Displays (MFD)

The RADAR menu is annunciated on the bottom half of the PFDs and/or MFDs. Push the RADAR button on the DCP to select and deselect the RADAR menu. A typical RADAR menu on the PFD is shown in *Figure 3.*

There are two items on the left side of the RADAR menu:

- MODE. The six radar operational modes that follow are listed below the MODE legend:

  STBY, TEST, MAP, WX, WX+T, TURB.

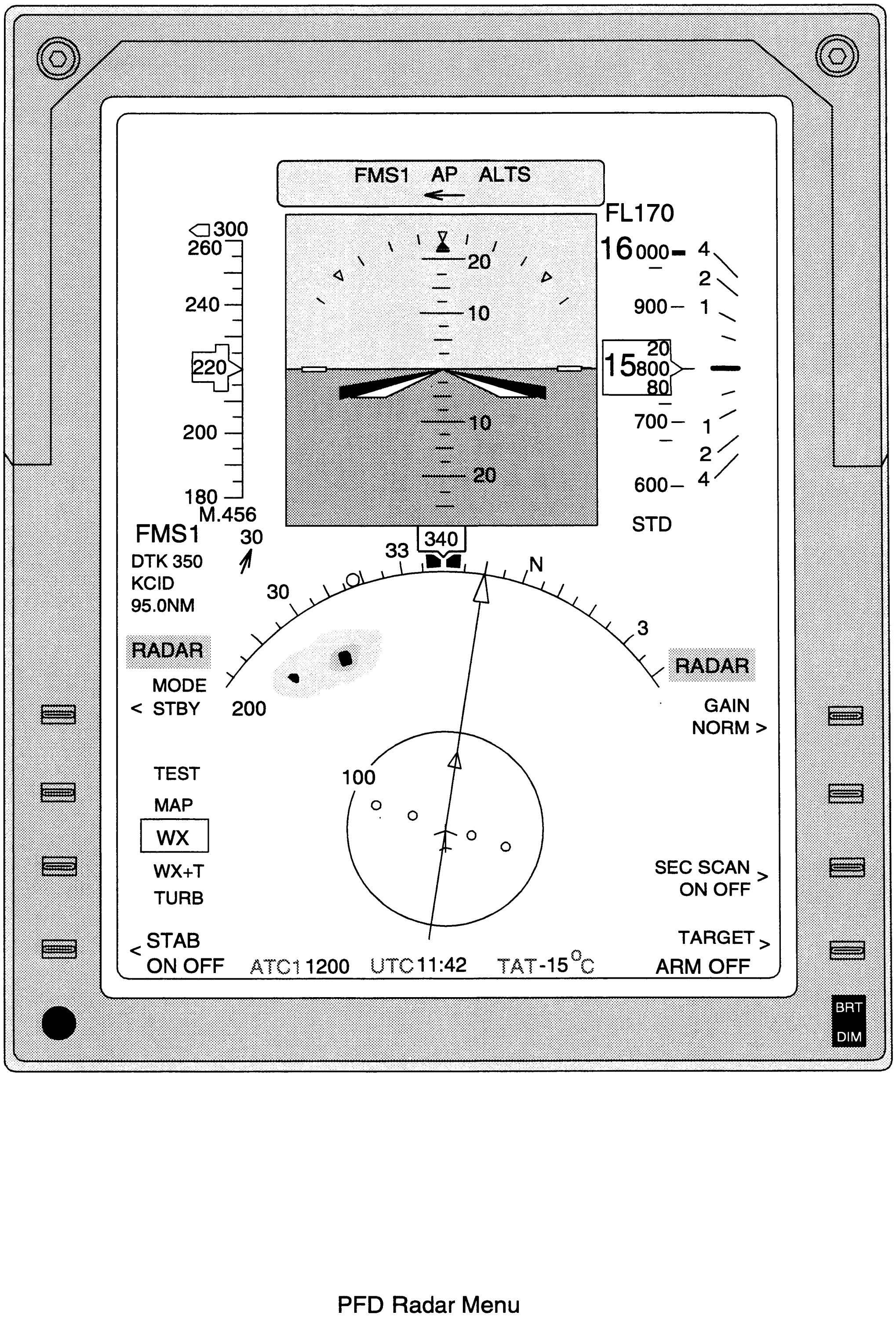
- STAB. May be set to ON or OFF.

There are three items on the right side of the RADAR menu:

- GAIN. May be set to NORM, ±1, ±2, ±3.
- SEC SCAN. May be set to ON or OFF.
- TARGET. May be set to ARM or OFF.

A cyan ‘Solid Box’ will always be shown around the currently active item or radar operational mode.

The individual RADAR menu items are annunciated adjacent to the related line select keys on the left and right of the display.



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PFD Radar Menu

Figure 3

RADAR menu items are cyan and larger characters when they are active, and white and smaller when they are not active, regardless of the current state of the radar overlay.

2. Operation *(Figures 3 and 4)*

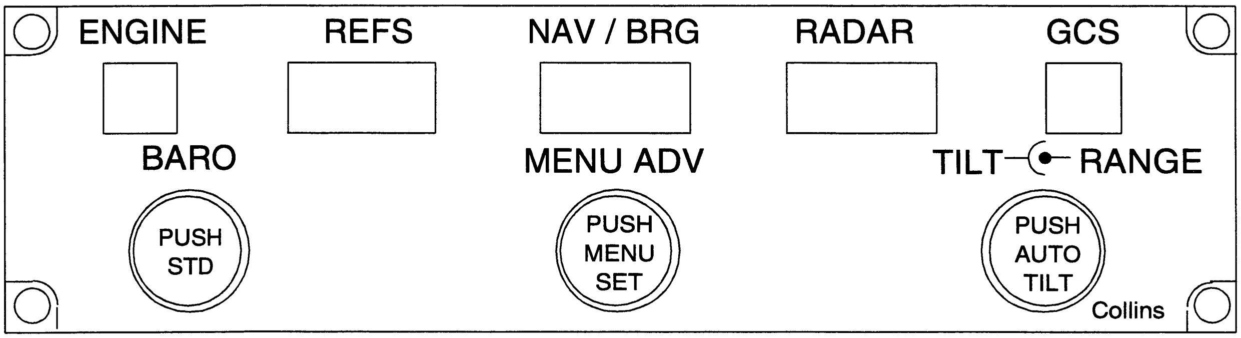
NOTE: There are eight Line Select Keys (LSK) on each PFD and MFD - four at the bottom left and four at the bottom right of each display. Throughout this procedure, the numbering of the LSKs is specified as:
Keys on the left side of the display are referred to as [L1] LSK (top) thru [L4] LSK (bottom).
Keys on the right side of the display are referred to as [R1] LSK (top) thru [R4] LSK (bottom).

NOTE: LSKs which are currently active have a side-facing caret (< or >) which points from their related legend to the LSK. Some menus may place legends near different LSKs when the LSK has no function. The absence of the side-facing caret shows the LSK has no function.

A. General

The DCP, in conjunction with the PFD/MFD's RADAR menu, uses a menu selection process to control the radar's modes and features.

A cyan 'Solid Box' will always be shown on the PFD/MFD around the currently active item or radar operational mode.



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Display Control Panel
Figure 4

(1) To move to, change and select the different items in the RADAR Menu, use either the DCP or PFD/MFD as follows:

(a) Use the DCP.

i Turn the MENU ADV rotary switch. Each 'click' of the MENU ADV switch moves the Solid Box on to the subsequent menu item, in the direction the switch was turned.

ii When the Solid Box has been moved to the new item, push the PUSH MENU SET button to cause the boxed item to become active.

(b) Use the PFD/MFD.

i Push the LSK adjacent to the new menu item. The Solid Box will move to this menu item, and the menu item will become active.

(2) To move to and select a new Radar Operational Mode in the MODE menu, use either the DCP or PFD/MFD as follows:

(a) Use the DCP.

i Turn the MENU ADV rotary switch. Each 'click' of the MENU ADV switch moves the Solid Box on to the subsequent menu item, in the direction the switch was turned.

ii When the Solid Box has been moved to MODE, push the PUSH MENU SET button to cause the Radar Operational Mode to become active.

iii Turn the MENU ADV rotary switch. Each 'click' of the MENU ADV switch moves the Solid Box on to the subsequent Radar Operational Mode.

iv When the Solid Box has been moved to the new Radar Operational Mode, push the PUSH MENU SET button to cause the boxed mode to become the active Radar Operational Mode.

(b) Use the PFD/MFD.

i Push [L1] LSK. The Solid Box will move to the currently active Radar Operational Mode.

ii Push [L1] LSK to move the Solid Box to the new Radar Operational Mode. Subsequent pushes of [L1] LSK will move through the available modes in a top to bottom to top selection order.

B. Power supplies

The Collins RTA-858 is supplied with 28 volts DC from the PS1 busbar.

C. DCP Controls

The table that follows gives a brief explanation of each of the controls on the DCP.

RADAR	... The RADAR pushbutton selects and deselects the RADAR menu on the PFD/MFD. The RADAR menu is automatically removed after 10 seconds of no activity. The RADAR title is white on a sky blue background, and is shown in two places: above [L1] LSK and [R1] LSK. The RADAR menu is divided into two parts, and shown below the two RADAR titles.
MENU ADV	... The MENU ADV rotary switch moves the cyan Solid Box on the PFD/MFD to the new Radar Operational Mode. The Solid Box always shows around the currently active (or last selected) Radar Operational Mode when the RADAR menu is selected. Each “click” of the MENU ADV switch moves the Solid Box one position.
PUSH MENU SET	... The PUSH MENU SET button is used to change the active state of a Radar Operational Mode. When the Solid Box on the PFD/MFD has been moved to the new Mode, push the PUSH MENU SET button to cause the boxed Mode to become the active Mode.
RANGE	... The RANGE rotary switch selects the display range of the radar and navigation display.
TILT	... The TILT rotary switch manually adjusts the tilt of the radar antenna by ±15.0 degrees. Clockwise rotation adjusts the antenna above the horizon, counterclockwise rotation adjusts the antenna below the horizon. If TILT is changed while the RADAR menu is shown, a tilt angle readout is shown for 5 seconds between [R2] LSK and [R3] LSK on the PFD/MFD.
PUSH AUTO TILT	... The PUSH AUTO TILT pushbutton selects and deselects the autotilt function. When autotilt is selected, an “A” suffix is shown after the Tilt readout on the PFD/MFD. When the autotilt is selected, the RTA automatically adjusts the radar antenna tilt to keep the tilt/range/altitude ratio that is active at the time autotilt is engaged. The manual TILT rotary switch can still operate with autotilt enabled, to let the tilt/range ratio be changed. Autotilt may be selected or deselected when the RADAR menu is active, or when the Radar Tilt Value is shows on the onside PFD/MFD.
GCS	... The GCS (Ground Clutter Suppression) pushbutton is used to make GCS active. When GCS is active, ground clutter returns are suppressed, which makes the interpretation of rainfall easier. The PFD/MFD limits GCS operation to 30 seconds when the GCS button is pushed. GCS can only be selected when WX or WX+T modes are active. The GCS annunciation replaces the active Radar mode legend on the PFD/MFD while the GCS is active.

D. PFD/MFD RADAR Menu

The table that follows gives a brief explanation of each of the items in the RADAR menu.

To move to, change and select the different Modes in the RADAR Menu, use either the DCP or PFD. Refer to A (1).

GAIN	The white GAIN legend is shown above [R1] LSK. Move the Solid Box until it is around the current Gain position. Push the PUSH MENU SET button to make the Solid Box start to flash (if [R1] LSK was pushed to move the Solid Box, it will start to flash immediately). Once it flashes, turn the MENU ADV rotary switch to change the Gain. Push the PUSH MENU SET button, [R1] LSK or any LSK, or the RADAR pushbutton (to deselect the RADAR Menu) to stop the flashes. Selections are NORM, ±1, ±2, ±3. The current GAIN value is shown in cyan. When the GAIN is any value other than NORM, radar returns are uncalibrated, and the display colors may no longer show the correct rainfall rates. Higher Gain values are useful to identify lighter levels of precipitation. Lower Gain values are useful to identify intense weather targets.
SEC SCAN	The white SEC SCAN legend is shown directly above [R3] LSK. Move the Solid Box until it is around the ON/OFF state, and make it active. Subsequent pushes of [R3] LSK will toggle the mode between ON and OFF. The active mode will be in larger cyan text and the inactive mode will be in smaller white text. Sector Scan reduces the radar antenna scan to ±30 degrees and consequently increases the display update rate. Select Sector Scan on either side PFD/MFD to reduce the scan arc on both pilots' displays. The last state chosen on either side (sector ON or OFF) will be the current state of operation for both sides.
STAB	The white STAB legend is shown above [L4] LSK. Move the Solid Box until it is around the ON/OFF state, and make it active. Subsequent pushes of [L4] LSK will toggle the mode between ON and OFF. The active mode will be in larger text and the inactive mode will be in smaller white text. The active mode will be in larger cyan text and the inactive mode will be in small white text. USTB (unstabilized) replaces the radar tilt annunciation when STAB is OFF. The radar antenna is usually gyro stabilized to stop airplane pitch and roll effects. Select STAB to OFF to turn the stabilization off.
TARGET	The white TARGET legend is shown above [R4] LSK. Move the Solid Box until it is around the ON/OFF state, and make it active. Subsequent pushes of [R4] LSK will toggle the mode between ARM and OFF. The active mode will be in larger cyan text and the inactive mode will be in smaller white text. The TARGET feature allows the radar to give an alert to the pilot when all onside radar displays have been deselected.
MODE	A white MODE legend is shown above [L1] LSK. The six radar operational mode selections (STBY, TEST, MAP, WX, WX+T, TURB) are described below. The active mode will be in larger cyan text and the inactive modes will be in smaller white text. To move to and select a new radar operational mode in the MODE menu, use either the DCP or PFD/MFD. Refer to A (2).

- STBY ... When the system is energized on the ground, the radar will be in STBY (Standby) mode. STBY is automatically selected 60 seconds after air to ground transition. When both pilots' PFDs/MFDs are in STBY, and one side selects an active operational mode (TEST, MAP, WX, WX+T, TURB), then both sides will go to that operational mode. Independent radar modes may then be selected by each pilot, but if either pilot selects STBY it will make both sides go to STBY.
- TEST ... TEST shows a rainbow-like pattern instead of normal radar returns.
- MAP ... MAP mode sets the system into the terrain-mapping mode. MAP mode automatically disables the PAC (Path Attenuation Correction) Alert and GCS features so that prominent geographic features can be shown.
- WX ... WX sets the system into the weather detection mode. Weather targets are shown in green, yellow, red and magenta. PAC and sensitivity time control (STC) are automatically enabled. PAC is to compensates for the radar beam absorption as it goes through a given precipitation cell. STC compensates for the stronger radar returns caused by storms. These two features overcome the tendency in an uncompensated radar to not show the true image of a precipitation cell.
- WX+T ... WX+T sets the system into the weather plus turbulence mode. The WX+T mode is the same as the WX mode, but along with weather detection, it includes the detection of precipitation-related turbulence, which is shown in magenta. The PAC feature is automatically enabled. If the current range is greater than 50 NM, the "+T" is white, and flashes for 5 seconds, then stays steady.
- TURB ... The TURB (turbulence) mode is only available when WX+T is active. The Turbulence only mode removes all targets except precipitation-related turbulence within the 50 nautical mile range. The TURB mode is a temporary mode that is useful to closely analyze areas of precipitation-related turbulence that have been detected while in the WX+T mode. TURB mode has a 30 second timeout. When TURB is selected, the WX+T mode is automatically shown larger and cyan, and in addition TURB becomes larger and cyan. After the 30 second timeout, the TURB mode is automatically deselected and the TURB annunciation becomes smaller and white, and WX+T stays active.

E. PFD/MFD Radar Displays

The weather radar display is overlaid on radar compatible formats on the PFD and/or MFD. Some display formats are not radar compatible.

(1) PFD formats:

(a) Compatible formats that can have weather radar display overlay:

i ARC

ii Present Position Map

(b) Formats that cannot have weather radar display overlay:

i Rose

(2) MFD formats:

(a) Compatible formats that can have weather radar display overlay:

i ARC

ii Present Position Map

(b) Formats that cannot have weather radar display overlay, but leave the RDR legend next to the [R2] LSK.

i Rose

ii Plan Map

iii TCAS Only display

(c) Formats that cannot have weather radar display overlay, and remove the RDR legend from the [R2] LSK:

i FMS Text Only

ii Maintenance Mode

If a radar compatible format is shown on the PFD/MFD, a cyan side-facing caret, which points from the legend RDR to the [R2] LSK, is shown. This shows that RDR [R2] LSK is "active" and can be used to select/deselect radar overlays. When a format is shown on the PFD/MFD which is not radar compatible, the caret is removed and if you push [R2] LSK it has no affect.

When the caret is shown, if you push RDR [R2] LSK on either the PFD or MFD, it toggles the display of radar reflectivity on or off on the associated display. When radar data is selected for display, the RDR legend is larger and cyan. If radar data is deselected from the display, the RDR legend is smaller and white. If RDR is selected for display, but an incompatible format is then selected, the RDR legend stays larger, but turns white. The RDR legend returns to cyan when a compatible format is selected again.

The PFD and MFD each show a display of radar status when RDR is the selected overlay. The radar status has two lines of text, below the RDR legend at [R2] LSK. When a radar compatible format is active on the PFD/MFD, the status annunciation is cyan. If the PFD/MFD format is changed so it is not radar compatible, the status annunciation turns white. If no radar operating mode is received by the PFD/MFD from the RTA, a white RDR OFF annunciation is shown in place of the radar mode. RDR OFF flashes for 5 seconds when first shown, then stays steady.

The first line of the radar status shows the currently selected radar operating mode, and, if selected to other than NORM, the GAIN selection. This line is right justified. The radar mode moves to the left when the GAIN selection shows. GAIN is shown as a "G" with a "+" or "-" sign and 1, 2, or 3. A blank character "space" separates the radar mode from the GAIN, when GAIN shows.

The second line of the radar status shows the TILT angle readout. USTB is also shown on this line. This line is right justified. The second line shows radar tilt annunciation which consists of a "T" followed by a "+" or "-" sign and up to three digits for the readout. The readout is suffixed by an "A" if autotilt is selected. Tilt range is +15.0 to –15.0 degrees. For tilt angles less than ten degrees only two digits are shown. A decimal point is shown to separate the tenths digit. The TILT display is right justified. The radar TILT annunciation shares the same location as the USTB annunciation. USTB is cyan if STAB is set to OFF. USTB is amber if an "attitude to the RTA" input fault occurs. For an attitude fault, the USTB legend flashes for 5 seconds then stays steady. If the TILT angle is changed while USTB shows, the USTB legend is replaced by the tilt annunciation, which shows for 5 seconds after the tilt setting changes have stopped. The display then reverts to the USTB legend.

NAVIGATION
INDEPENDENT POSITIONING DETERMINING
WEATHER RADAR SYSTEM (COLLINS RTA-858)
ADJUSTMENT/TEST

1. RTA-858

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the Weather Radar and the Display Control Panel.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the Weather Radar and the Display Control Panel.

NAVIGATION
INDEPENDENT POSITION DETERMINING
XM WEATHER SYSTEM
DESCRIPTION AND OPERATION

1. INFORMATION
(EFFECTIVITY: AIRPLANES SERIAL NO. 258744 AND AFTER OR AIRPLANES WITH KITS AAC-0409 AND AAC-0410 (WHEN XM WEATHER SYSTEM INSTALLED))

2. DESCRIPTION

The XM Weather format provides the capability to display and manipulate graphical and textual weather information on the Multifunction Display (MFD). The graphical weather and textual information is provided by Baron Services Information Service Provider (XM) via a satellite. The graphical and textual weather information is updated automatically, stored on the Integrated Flight Information System (IFIS) File Server Unit (FSU) and the most recent data is available for display based on the selected overlays.

The ground weather service provider supplies the types of graphical and textual weather information that follows:

- Next Generation Weather Radar (NEXRAD) graphical weather.
- Echo Tops (Altitude, Speed and Direction of the tops of major storm cell) graphical weather.
- Graphical and textual Aviation Routine Weather Report (METAR).
- Graphical and textual Significant Meteorological Report (SIGMET).
- Textual Airman’s Meteorological advisory (AIRMET).
- Textual Terminal Aerodrome Forecasts (TAF).

The XM satellite receiver and antenna, FSU, and the MFD support the XM weather system.

3. OPERATION

A. XM Receiver

The XM satellite receiver receives graphical and textual weather information (GWX Data). The XM receiver uses the XM weather receiver antenna which is combined with the GPS 1 antenna. The receiver unpacks the data and transfers it to the FSU.

The XM receiver is powered from the PS2 busbar via the circuit breaker XMSAT on panel DA-A

The XM receiver is located between frames 9 and 9A behind the front baggage compartment sidewall.

B. File Server Unit

The FSU uses the GWX purchased option of the File Server Application to manipulate the various weather products provided by the XM receiver and create a display list for transfer to the MFD. For further details of FSU refer to Integrated Flight Instrument System (Ref. 34-60-40, 001).

C. Multifunction Display

Using the Cursor Control Panel (CCP), the desired graphical or textual weather information is selected for display from the GRAPHICAL WEATHER Main Menu on the MFD. For further details of CCP refer to Integrated Flight Instrument System (Ref. 34-60-40, 001).

NAVIGATION
INDEPENDENT POSITION DETERMINING
XM WEATHER SYSTEM
MAINTENANCE PRACTICES

1. INFORMATION
(EFFECTIVITY: AIRPLANES SERIAL NO. 258744 AND AFTER OR AIRPLANES WITH KITS AAC-0409 AND AAC-0410 (WHEN XM WEATHER SYSTEM INSTALLED))

Equipment/Material	Part/Item No.
Polysulfide Sealant	313 (Ref. AMM 125/H-20, 20-95-301)
Cleaner, Solvent	201 (Ref. AMM 125/H-20, 20-95-201)
Aluminum wool	Local Supply

A. Preliminary Procedures

(1) If the XM Weather Receiver (XMWR) is to be removed, open, safety clip and tag the circuit breaker that follows:

Panel	Label
DA-A	XMSAT

(2) If the XMWR antenna is to be removed, open, safety clip and tag the circuit breakers that follow:

Panel	Label
DA-A	XMSAT
DA-A	GPS 1

2. XM WEATHER RECEIVER

A. Removal

	MECH	INSP
(1) Do the preliminary procedure, paragraph 1.A. (1).		
(2) To get access to the XMWR, remove the outboard closeout panels of the forward baggage compartment as necessary to get access between frames 9 and 9A (Ref. MMA, 25-22-03, 201).		
(3) Disconnect the co-axial cable plug and the electrical connector from the XMWR sockets.		
(4) Loosen the four fasteners that attach the XMWR mounting plate to the airframe.		

	MECH	INSP
(5) Remove the mounting plate complete with the XMWR.		
(6) Remove the four nuts, screws and washers that attach the XMWR to the mounting plate and remove the XMWR. Keep the attachment hardware.		
(7) Install protective caps or covers to the exposed electrical connections.		

B. Installation

	MECH	INSP
(1) Remove the protective caps or covers from the electrical connections.		
(2) Put the XMWR in position on the mounting plate and install the four screws, washers and nuts that attach the XMWR to the mounting plate.		
(3) Install the mounting plate and XMWR to the airframe and install the fasteners.		
(4) Connect the co-axial plug and the electrical connector to the XMWR sockets.		
(5) Install the outboard closeout panels of the forward baggage compartment as necessary (Ref. MMA, 25-22-03, 201).		

C. Adjustment/Test

(1) Put the airplane in position in the open air where satellite access is possible.

(2) Remove the safety clips and tags and close the circuit breaker opened in paragraph 1.A. (1).

(3) Energize the 28 Vd.c. busbars (Ref. 24-01-00, 201).

(4) Use the Cursor Control Panel (CCP) and MFD to access the GRAPHICAL WEATHER MAIN Menu and make sure that graphical or textural weather is viewed on the MFD.

(5) De-energize the 28 Vd.c. busbars (Ref. 24-01-00, 201).

D. Close Up

(1) Make sure that the work area is clean and clear of tools and other equipment.

3. XM WEATHER ANTENNA

A. XM/GPS No.1 Antenna Removal

	MECH	INSP
(1) Do the preliminary procedure, paragraph 1.A. (2).		
(2) To get access to the XM/GPS No.1 antenna, remove the roof panels to access the roof area between frames 7 and 8.		
(3) Remove the two co-axial cable connectors from the antenna.		

	MECH	INSP
(4) Remove the four screws that attach the antenna to the mounting plate and remove the antenna. Keep the attachment hardware.		
(5) Install protective caps and covers to the antenna connections.		
(6) Carefully remove any remaining old sealant from the mounting plate, airplane skin and attachment hardware.		

B. XM/GPS No.1 Antenna - Installation

	MECH	INSP
(1) Make sure that the bonding areas of the attachment screws, antenna and mounting plate mating surfaces are not damaged or contaminated.		
(2) Clean the mating surfaces of the antenna and the mounting plate with solvent cleaner (Item 201) and aluminum wool.		
(3) Put the antenna in position on the mounting plate and attach with the 4 screws. Apply a fillet of sealant (Item 313) to the periphery of the antenna and to the heads of the screws.		
(4) Remove the cap and cover from the connectors and connect the two co-axial cables to the antenna.		
(5) Install the roof panels.		
(6) Remove the safety clips and tags and close, the circuit breakers opened in paragraph 1.A. (2).		

C. Adjustment/Test

(1) Do the test procedure for XMWR (Ref. paragraph 2.C.),

(2) Do the test procedure for GPS-4000A antenna (Ref. 34-50-45, 501).

(3) Do the test procedure for the INTEGRATED FLIGHT INFORMATION SYSTEM (Ref. 34-60-40, 201).

D. Close Up

(1) Make sure that the work area is clean and clear of tools and other equipment.

RECEIVER/TRANSMITTER/ANTENNA UNIT (TYPE RTA-858) - REMOVAL/INSTALLATION

1. Antenna assembly

A. Removal

(1) Open and safety tag the circuit breaker that follows (Chapter 24, ELECTRICAL POWER).

Panel	Label
DA-A	RADAR

(2) Release the fasteners and open the radome. Raise the radome and lock the support strut into place.

(3) Loosen the two lock screws that attach the electrical connector to the Receiver/Transmitter/ Antenna (RTA) assembly.

(4) Disconnect the electrical cable connector and install an approved cap and cover to the plug and socket.

(5) Mark the position of the antenna assembly by painting suitable reference marks on the scanner mounting adapter.

NOTE: A shim may be installed between the RTA scanner adapter assembly and the mounting bracket, this is to set the RTA to the correct angle.

(6) Support the RTA assembly, remove the four attachment bolts and washers and remove the RTA assembly from the scanner adapter assembly.

B. Installation

(1) Support the antenna assembly in the correct position against the scanner adapter assembly and install the four bolts and washers. Torque tighten all four bolts to 20 lbf.ins. (2.26 Nm.).

(2) Remove the cap and cover from the electrical cable connectors. Connect the cable connector to the RTA assembly and tighten the two lock screws.

(3) Release the support strut and lower the radome and close the fasteners.

(4) Remove the safety tag and close the circuit breaker opened at paragraph 1.A.(1) (Chapter 24, ELECTRICAL POWER).

(5) Do a functional test of the weather radar system (WEATHER RADAR SYSTEM).

C. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous items of equipment.

RECEIVER/TRANSMITTER/ANTENNA UNIT (TYPE RTA-858) - INSPECTION/CHECK

1. Antenna assembly

A. Inspection

Equipment/Materials	Item/Part No.
Grease, extreme pressure (low temperature)	078 (Chapter 20-95-11)
Cleaning agent	Genesolv 2004 (Collins Manual 523-0774656)
Small, soft-bristled brush	Local supply
Lint free cloth	621 (Chapter 20-95-601)

(1) Open and safety tag the circuit breaker that follows (Chapter 24, ELECTRICAL POWER).

Panel	Label
DA-A	RADAR

(2) Release the fasteners and open the radome. Raise the radome and lock the support strut.

(3) Do an inspection of the mechanical portion of the RTA (the scan/tilt gears and sectors) for contamination with dirt and/or a grease buildup.

CAUTION: MAKE SURE THE CLEANING AGENT DOES NOT COME INTO CONTACT WITH THE SCAN/TILT AXIS BEARINGS. THE BEARINGS ARE LIFETIME LUBRICATED AND MUST NOT BE CONTAMINATED.

(4) Clean the gears and sectors with a small soft-bristled brush and cleaning agent.

NOTE: If the mechanism is severely contaminated it may be necessary to remove the RTA for cleaning.

(5) Apply a thin layer of grease to the touching surfaces of the teeth of the scan/tilt gears and sectors.

(6) Remove any excess grease from the surrounding area with a lint free cloth (Item 621).

(7) Release the support strut and lower the radome and close the fasteners.

(8) Remove the safety tag and close the circuit breaker opened at paragraph 1.A.(1) (Chapter 24, ELECTRICAL POWER).

(9) Do a functional test of the weather radar system (WEATHER RADAR SYSTEM).

B. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous items of equipment.

ALLIEDSIGNAL MK.V ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) - DESCRIPTION AND OPERATION

1. Description

A. General

The Enhanced Ground Proximity Warning System (EGPWS) is effectively three independent systems in one LRU. The LRU contains the traditional GPWS functionality and interface; which produces "reactive warnings" (warnings that require action based on real time input to the GPWS). These warnings help prevent Controlled Flight Into Terrain (CFIT) and are categorized into five modes (GPWS Mode 1 thru 5). Each Mode has a distinct aural alert and some Modes have associated visual annunciations. The GPWS is also capable of providing a sixth mode, which can include altitude related callouts and/or an excessive bank angle callout. The Collins Pro Line 21 (PL21) system interface with the GPWS is limited to supplying existing PL21 digital data to the GPWS; and to providing the PULL UP and GND PROX annunciation on the PFD. Details of the PL21/GPWS interface are supplied in this chapter.

EGPWS is an enhancement to GPWS. It contains a worldwide database which has terrain, airport, and other data. EGPWS provides predictive warnings based on the airplanes present position (supplied by the FMS or GPS) and the EGPWS's projection of the airplanes flight path (based on current airplane conditions). The EGPWS compares its flight path projection with the database to detect upcoming hazardous conditions. The EGPWS provides aural and visual warnings to alert the pilot if it detects a hazardous condition. EGPWS also includes the capability to graphically represent terrain elevation features on the AFDs. The Collins Pro Line 21 (PL21) system interface with the EGPWS is limited to supplying existing PL21 digital data to the EGPWS; to providing the PULL UP and GND PROX annunciations on the PFD; to providing the graphical representation of the terrain elevation on the PFD or MFD; and, to providing Peaks elevation value on the PFD or MFD. Details of the PL21/EGPWS interface are supplied in this chapter.

Some EGPWS installations are integrated with sufficient airplane sensors so that the EGPWS provides Windshear Alerts (cautions/warnings). This EGPWS Mode 7, provides Windshear Caution or Warning alerts if inertial accelerations versus air mass accelerations (along the flight path and perpendicular to the flight path) exceed established threshold values. Windshear alert annunciation is provided on the PFD. The alerts are active when signalled by the EGPWS computer.

NOTE: GPWS and EGPWS will be referred to as EGPWS (except to clarify requirements). The term 'terrain; will be used as synonymous with the term 'terrain elevation'.

EGPWS is comprised of the unit that follows:

- One Enhanced Ground Proximity Warning Computer (EGPWC). This is supplied with 28 volts DC from PS1 bus.

Pro Line 21 includes the features that follow which support EGPWS:

- Specified Warning and Caution Alerts on PFD
- Independent manual selection of Terrain data on PFD and MFD
- Configurable support for automatic (pop–up) selection of Terrain data on MFD
- Specified EGPWS Mode and Fault annunciations, including Peaks elevation values

EGPWS requires the units listed below to operate:

- Display Control Panels (DCPs)
- Primary Flight Displays (PFDs)
- Multifunction Displays (MFDs)
- Flight Management Computers (FMCs)
- DCUs – for specified digital airplane information
- Global Positioning Sensors (GPS)
- ILS Navigation Receivers (VIR–432s)
- Radio Altimeter(s) – ALT–4000(s)
- Attitude Heading System(s) – AHS(s)
- Air Data System(s) – ADS(s)

B. EGPWS PFD Displays *(Figure 1)*

General Description

EGPWS Alerts are shown on the PFD when commanded by the EGPWS. Mode and Fault annunciations are shown on the PFD when appropriate. When selected, the PFD shows graphical Terrain data on compatible Formats, refer to paragraph 2.A.

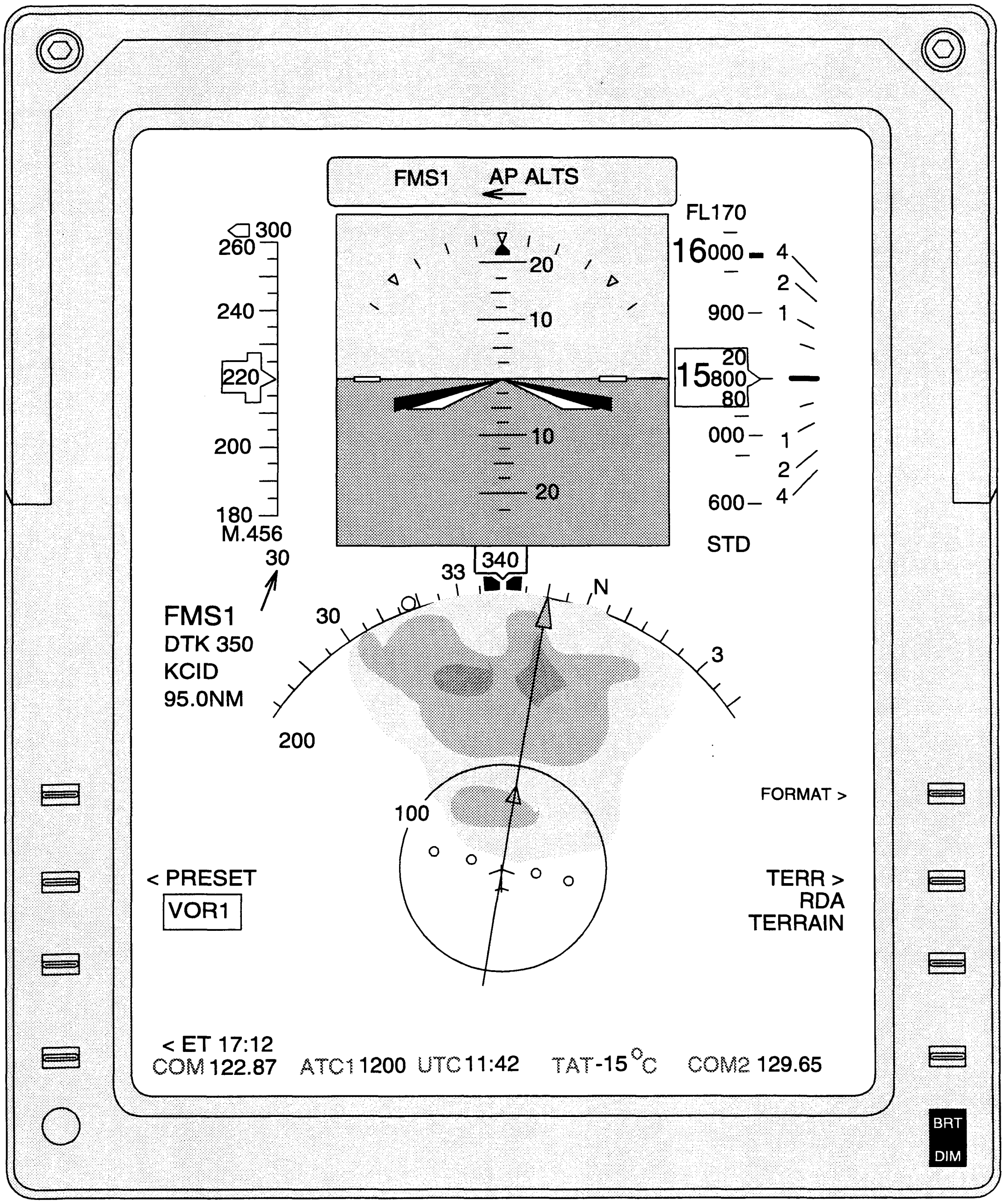
2. Operation

A. Detailed requirements for PFD EGPWS displays and operation

Controls

RDR/TERR LSK:

- With the EGPWS option RDR/TERR LSK active, via the correct CSU OCM being installed, a TERR Legend is added to [R2] LSK above the existing RDR (or LX/RDR) legend.
- If a TERR/RDR compatible Format is shown, refer to paragraph 2.D., a cyan side facing caret, pointing at [R2] LSK, is shown. This indicates [R2] LSK is “active” and can be used to select/de-select overlays. When a TERR/RDR compatible Format is not active, the caret is removed and pushing the LSK has no affect, except as defined below.
- When the caret is shown, repetitive pushes of [R2] LSK selects the active overlay on the AFD. The first push selects Terrain data for display, the next push selects RDR and de-selects TERR; the next push selects RDR and LX (if installed) for display. The next push returns the display to its starting state, with all overlays turned off.



M5776
HA00B995412/

Terrain Overlay on the ARC Format
Figure 1

- When TERR is selected for display the TERR Legend is larger and cyan; when the terrain data is de-selected from the display the TERR Legend is smaller and white. If TERR is selected for display, but an incompatible Format is then selected, the TERR legend remains larger, but turns white; the TERR Legend returns to cyan when a compatible Format is selected again.
- Regardless of the current Format or LSK caret, when TERR is not the active overlay and the EGPWS declares a Terrain Awareness Warning or Caution (refer to Table 1), an inverse video cyan box is placed around the white TERR legend, and the cyan caret is shown to indicate that pushing the LSK will cause an immediate response. In this case, the first momentary push of the TERR LSK will select Terrain for display at its default Range and Format, and remove the inverse video box from both the PFD and MFD on the side on which the LSK was pushed. This restores normal LSK operation. The inverse video box and caret are removed if the associated Caution or Warning goes away and TERR is not selected.
- Regardless of the current Format or LSK caret, when the TERR Legend is shown next to [R2] LSK continuously pushing [R2] LSK for more than 1 second will automatically select the TERR Overlay at the TERR default Range and Format. The caret appears, if not previously in view, when the LSK is first pushed, but returns to the “out of view” state (if appropriate) if the LSK is not pushed for more than 1 second. Calling up TERR in this manner restores normal LSK operation.

Terrain or Radar Overlay:

- Terrain data and Weather Radar reflectivity cannot be shown at the same time on a single display. Manual or automatic selection of Terrain data automatically de-selects Weather Radar (and Lightning (LX), if installed). Similarly, selection of Weather Radar (or LX/RDR) automatically deselects Terrain.
- The AFD area normally used to show the RDR Status lines serves a dual function when EGPWS is installed. When RDR (or LX/RDR) is selected, the Status lines show only the Radar Status, as described in Section 8. When TERR is selected, the Status lines show only the Terrain status. When neither RDR or TERR is selected, the Status lines are blank.
- Because selection of Terrain automatically de-selects Radar, selection of Terrain causes Radar TGT/TRB monitoring to become active if TGT Alert had been Armed and other TGT Armed conditions are met. Refer to Section 8. for TGT Alert.

NOTE: TGT/TRB alert can only occur if at least one PFD is listening to the Radar ARINC 453 bus. If all PFDs are selected to Terrain, no TGT/TRB alert will occur, even if the function is armed.

Terrain Range:

- Range is selectable from the onside Display Control Panel (DCP) RANGE Knob (ELECTRONIC FLIGHT INSTRUMENT SYSTEM). Changes to Range while Terrain is shown affect the PFD Normal Range (TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (COLLINS TCAS II)).
- Terrain data is available with selected ranges up to 320 NM (300 NM GenAv). If the display range is at a value greater than 320NM/300NM when the pilot selects Terrain, the display range will automatically reduce to 320 NM (300 NM GenAv).
- If Terrain data has been selected to show on either the onside PFD or MFD, onside pilot selection of display ranges greater than 320 NM (300 NM GenAv) will be inhibited.
- Range remains at its current value if Terrain is de-selected from display.

TERR Default at Power UP:

- At system power up in the air or on the ground, Terrain display status on each AFD will be restored to the state that existed when power was removed.

Other Interfaces:

- On the center instrument panel there are switch/annunciators for dedicated EGPWS functions, these are:
  - Flaps Override
  - Terrain Inhibit
  - Glideslope Inhibit
  - Altitude Callouts Inhibit
  - The EGPWS Test Button is on the overhead panel.

B. Annunciations

PFD EGPWS Alerts:

- The table that follows lists the EGPWS Alerts, which over–write the pitch tape in the lower half attitude display of the PFD when they are asserted by the EGPWS. Each of the Alerts flash for five seconds when first shown, then steady. Alerts are only shown if the SSM of their digital word is Norm Op or Test. Alerts are not shown if their associated Failure Annunciator is shown. Alerts share the same field; they are presented in the order listed in case of conflicts.

Table 1
Alerts

ALERT	COLOR	CONTROL BIT	FAILURE ANNUNCIATOR
WINDSHEAR (warning)	RED	On–side or Cross–side L274, Bit 15 Windshear Warning	WS
PULL UP (GPWS)	RED	On–side or Cross–side L274, Bit 13 GPWS Warning	GPWS
PULL UP (EGPWS)	RED	On–side or Cross–side L274, Bit 22 Terrain Awareness Warning	TERR
GND PROX (GPWS)	AMBER	On–side or Cross–side L274, Bit 12 GPWS Alert	GPWS
GND PROX (EGPWS)	AMBER	On–side or Cross–side L274, Bit 23 Terrain Awareness Caution	TERR

Table 1
Alerts

ALERT	COLOR	CONTROL BIT	FAILURE ANNUNCIATOR
WINDSHEAR (caution)	AMBER	On–side or Cross–side L274, Bit 18 Windshear Caution	WS

NOTE: The EGPWS is the normal controller of prioritization of all Alerts.

NOTE: Windshear Alerts are typically provided between 10 and 1500 feet AGL.

PFD EGPWS Failure Annunciators:

- The PFD shows EGPWS Failure annunciations. The amber Failure annunciators associated with EGPWS are shown regardless of the state of Terrain (TERR) display selection. Each Failure annunciator flashes for 5 seconds when it first comes in view, then steady.
- A WS (Windshear) failure annunciation is shown boxed, in medium letters, when EGPWS Alert Discrete Word 2 Windshear Inop bit is asserted, in the lower left section of the ground portion of the attitude display.
- A GPWS failure annunciation is shown boxed, in medium letters, when EGPWS Alert Discrete Word 2 GPWS INOP bit is asserted in the lower left section of the ground portion of the attitude display, above the WS annunciator location.
- A TERR (Terrain) failure annunciation is shown in medium letters positioned on the second line of text from the bottom of the display, centered approximately around a point 66% away from the left side, when any of the conditions listed below are true.
  - The EGPWS Alert Discrete Word 2 Terrain Awareness Inop bit is asserted;

    or
  - The Mode Code in the Terrain Data Word is Spare, or the Mode Code is not defined for use as a Mode Annunciation (below);

    or
  - The Terrain Data Word or the EGPWS Alert Discrete Word 2 are missing or invalid;

    or
  - The Terrain Awareness Not Available bit is asserted in EGPWS Alert Discrete Word 2;

    or
  - A usable Accept Data code does not exist in the Data Accept Code field of the Terrain Data Word.
  - Terrain range received on the 453 bus does not match the current AFD range.
- Except during TERR TEST Mode (defined below), if the TERR failure is shown, the graphical terrain data will not be shown; and terrain is removed if already shown.

AFD EGPWS Mode Annunciations:

- EGPWS Mode annunciations are shown in the space normally associated with Radar Status (paragraph 2.A. Controls). The current EGPWS mode is shown on Mode Line 1 (immediately beneath the TERR legend associated with [R2] LSK when Terrain has been selected for display. When a Terrain compatible Format is active on the AFD, the Mode annunciation is cyan. If the AFD Format is changed so it is not Terrain compatible, the Mode annunciation becomes white.
- When TERR is selected, no Radar Status is shown.
- "TERRAIN" Mode annunciation is shown in small characters when the Terrain Data word Mode Code is set to Terrain.
- "TERR INHB" Mode annunciation is shown in small characters when the Terrain Data word Mode Code is set to Inhibit. When TERR INHB is the EGPWS Mode, the AFD removes all Terrain data from display.
- "TERR TEST" mode annunciation is shown in small characters when the Terrain Data word Mode Code is set to Test, or if the EGPWS Alert Discrete Word 2 has an SSM of Test. When TERR TEST is the EGPWS Mode, the GPWS computer sequentially activates each of its failure annunciators, in addition to outputting a Test Terrain pattern; therefore, the normal AFD requirement to not show Terrain data when a TERR Failure is present is over–ridden to allow eyestrain Test pattern to be shown.

NOTE: Dedicated EGPWS Alerts and Failure annunciations will be shown as commanded by the GPWS computer during its test cycle. Select Terrain to see the Terrain test pattern shown on the desired AFD.

Overlay Fault Field:

- When TERR is selected to be shown on the AFD, Terrain Overlay Fault annunciations are provided in the Overlay Fault Field near the bottom of the display. The Terrain Overlay Fault annunciators are removed if Terrain is de-selected from display. Only one Terrain Overlay Fault annunciation can be shown at a time, in case of conflict they are shown in the order listed.
- RADAR RANGE XXXNM is not shown on the AFD when TERR is selected; but RADAR ON has priority over all Terrain use of the Overlay Fault Field (WEATHER RADAR SYSTEM (COLLINS RTA-858)).
- TERR RANGE XXXNM is shown in haloed white characters if the AFD range and EGPWS range do not agree for more than 4 seconds. XXXNM is the EGPWS range currently reported from the GPWS computer on the ARINC 453 bus.

AFD Terrain Fail Message:

- When TERR is actively shown on the AFD and conditions causing a TERR Fail annunciation (described above) occur, haloed amber "TERRAIN FAIL" is shown immediately above the area reserved for FMS "NO FLIGHT PLAN." TERRAIN FAIL message flashes for 5 seconds when it first comes in view, then steady. The message is removed if TERR overlay is de-selected. The message is not shown if a Format incompatible with TERR is selected.

C. Inputs/Outputs

The data that follows is supplied in 429 format to the GPWS computer from the PL21 System. Data accuracy for each Collins supplied item is detailed in the Collins System Specification for the Airplane Type, or in the Specification/Requirements Document applicable to each LRU. Other digital data is present on each bus.

Some labels, resolutions, or scaling may not be in accordance with Arinc standards. All data utilized from each bus by the GPWS computer must be verified compatible by the EGPWS manufacturer; and, as acceptable both with respect to data type and originating data source. Refer to the Data Dictionary for word definitions, resolution, or other information related to each digital word. Refer to the Wiring Diagrams for specific connections to/from each LRU.

NOTE: FAA Notice 8110.64 (EGPWS) states that if the "accuracy of the EGPWS navigation source is suitable for each phase of flight it is expected that the EGPWS will be suitable for use when the primary navigation system is approved for specific operation." Use of data from sources other than those being shown to the pilot requires appropriate engineering justification by the GPWS computer manufacturer.

NOTE: AHC, ADC, and RALT parameters (listed below as separate buses) are alternatively available on GPBUS–5.

- AHC – Each installed Attitude Heading Computer has a bus that runs directly to the GPWS computer. Mag HDG, Pitch Angle, Roll Angle, Long. Accel. (Body), Normal Accel. (Body) are available on this bus.
- ADC – Each installed Air Data Computer has a bus that runs directly to the GPWS computer. Altitude (29.92), Airspeed (indicated), Vertical Speed (raw), TAS, and SAT are available on this bus.

NOTE: Baro–Corrected Altitude is not available on this bus. TAS and SAT are available only when a TAT probe is connected to the ADC.

- GPS – Each installed Global Positioning Sensor has a bus that runs directly to the GPWS computer. Altitude (GPS), HDOP, VDOP, Track Angle True (GPS), Present Position Latitude (GPS), Present Position Longitude (GPS), Groundspeed (GPS), Present Position Latitude Fine (GPS), Present Position Longitude Fine (GPS), UTC (GPS), Horizontal Integrity Limit Autonomous, VFOM, Vertical Velocity (GPS), HFOM, Date (GPS), GPS Sensor Status are available on this bus.

NOTE: Collins GPS is 743A format.

- RALT – Each installed Radio Altimeter has a bus that runs directly to the GPWS computer. Radio Height is available on this bus.
- GPBUS–5 – Both GPBUS–5 buses are connected directly to the GPWS computer. Condensed information from each installed onside ILS, PFD, MFD, FMC, FGC and DCU is available on this bus.

(1) FMC – FMS Navigation Mode (Navigation source/accuracy), Present Position Latitude (FMC), Present Position Longitude (FMC), Groundspeed (FMC), Track Angle True (FMC), True Heading (from FMC, not a TSO'd Heading source).

(2) ILS – Localizer Deviation, Glideslope Deviation.

(3) PFD – Selected Course, PFD Mode Select Word 1 (ADC Source, ATT/HDG Source, Radio Altimeter Source, AOA Source, Active Nav Source), Selected MDA (from PFD), PFD Mode Word 1 (PFD Mode, PFD Range), Selected Decision Height (from EFIS).

NOTE: Current airplane altitude on this bus is Baro–Corrected Altitude.

(4) MFD – MFD Discrete Control Word 1 (Terrain Overlay), MFD Mode Word 1 (MFD Mode, MFD Range).

(5) DCU – Flap Lever Position, Weight on Wheels, Gear Down.

(6) AOA – AOA (Normalized) comes from an Airframe supplied source.

(7) FGC – FGC Mode Word 2.

NOTE: GPWS computer requires Body AOA for Mode 7, which is not available from the Collins system.

The following data is supplied in 429 format to the PL 21 System from the GPWS computer. Other digital data may be present on each bus. Refer to the Data Dictionary for word definitions, resolution, or other information related to each digital word. Refer to the Wiring Diagrams for specific connections to/from each LRU.

- EGPWS – 1/2. 2 low speed 429 buses, one goes to each IOC. Peaks Lower Elevation (MSL) (AFD), Peaks Upper Elevation (MSL) (AFD), EGPWS Alert Discrete Word 1 (FDR), EGPWS Alert Discrete 2 (provides alerts/flags and Pop–up logic for AFD, FDR), EGPWS Alert Discrete Word 3 (FDR), EGPWS Fault Diagnostic Word 1 (diagnostics), EGPWS Fault Diagnostic Word 2 (diagnostics), EGPWS Fault Diagnostic Word 3 (diagnostics).
- EGPWS TERRAIN – 1/2. 2 high speed 453 buses, one goes to each installed onside PFD and MFD. Terrain Data (provides terrain controls, modes, and graphical information).

D. Limits

Terrain Colors (elevation) are defined in Tables 2 and 3 below:

Table 2
Limits

Color	Terrain Elevation
Solid Red	Terrain Threat Area – Warning
Solid Amber	Terrain Threat Area – Caution
50% Red Dots	Terrain that is more than 2000 feet above airplane altitude
50% Amber Dots	Terrain that is between 1000 and 2000 feet above airplane altitude
25% Amber Dots	Terrain that is 500 (250 with gear down) feet below to 1000 feet above airplane altitude (Peaks Only).

Table 2
Limits

Color	Terrain Elevation
Solid Green	Shown only when no Red or Amber terrain areas are within range on the display. Highest terrain not within 500 (250 with gear down) feet of airplane altitude (Peaks Only).
50% Green Dots	Terrain that is 500 (250 with gear down) feet below to 1000 below airplane altitude.
	Terrain that is the middle elevation band when there are no Red or Amber terrain areas within range on the display (Peaks Only).
16% Green Dots	Terrain that is 1000 to 2000 feet below airplane altitude.
	Terrain that is the lower elevation band when there are no Red or Amber terrain areas within range on the display (Peaks Only).
Black	No significant terrain.
16% Cyan	Terrain Elevation equal to 0 feet MSL. (Peaks Only requires co patible display.)
Magenta Dots	Unknown terrain.

NOTE: The GPWS computer controls colors, this table is for information purposes only.

Table 3
Terrain colors and elevation

1st Bit	2nd Bit	3rd Bit	Color Code
0	0	0	Black
1	0	0	Green
0	1	0	Amber
1	1	0	Red
0	0	1	Magenta

NOTE: Bits are listed in transmission order and each are applicable to each bin, (1–512) in the EGPWS 453 word.

Terrain Scan:

- Graphical Terrain data is shown in a ±9° arc in front of the airplane. Terrain data incrementally fans out from the lubber line (center of the display) to both sides simultaneously. After moving out to both edges the sweep starts over at the lubber line.

Terrain Display Ranges:

- TERR default range is 10NM.
- Refer to (Chapter 34-70-05, EFIS) for Display Ranges

Formats that can have Terrain overlay:

- ARC. ARC is also the TERR default format.
- Present Position Map

Formats that cannot have Terrain overlay:

- Rose
- Rose/TCAS

E. EGPWS MFD Displays

General Description:

When selected, the MFD shows Terrain data on compatible formats.

F. Detailed Requirements for MFD EGPWS Displays and Operation follow:

Controls

Except as listed below, the MFD controls for EGPWS are the same as described for the PFD.

- Rose, Plan Map, and TCAS Only are not compatible with Terrain display. When one of these modes is selected, the RDR/TERR legend normally associated with [R2] LSK turns white (if previously cyan) and the cyan caret is removed. Normal LSK functionality is restored when a Terrain compatible format is selected.
- ASCII Text Formats (Maintenance, FMS Text Only) do not support RDR/TERR on [R2] LSK. The RDR/TERR Legend and associated caret are removed when ASCII Text Formats are shown, selection of TERR is inhibited until a compatible Format is selected or a EGPWS Pop–Up occurs (if enabled).

Annunciations

The MFD annunciations for EGPWS are the same as described for the PFD (refer to paragraph 1.B.), except for the following:

- The Alerts (WINDSHEAR, PULL UP, GND PROX) and Fail annunciations (W/S, GPWS and TERR) are shown exclusively on the PFD.
- RADAR ON indication is not shown on the MFD.

Inputs/Outputs

Refer to paragraph 1.C. for PL21/EGPWS Inputs/Outputs.

Display Limits

Modes that can have Terrain Overlay:

- ARC
- Present Position Map

Modes that cannot have Terrain overlay; but leave the TERR legend next to [R2] LSK:

- Plan Map
- TCAS only display Modes that cannot have Terrain overlay; and remove the TERR legend from [R2] LSK:
- FMS Text Only
- Maintenance Mode

ALLIEDSIGNAL MK.V ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) - REMOVAL/INSTALLATION

1. EGPWS

A. Preliminary procedures

(1) Open and safety tag the circuit breaker that follows (Chapter 24, ELECTRICAL POWER).

Panel	Label
DA-A	EGPWS

B. Removal

(1) Remove the furnishings/equipment as necessary to get access to the EGPWS computer installed below the co-pilot's seat.

CAUTION: DO NOT LIFT THE UNIT OR APPLY SIDE FORCE UNTIL THE REAR CONNECTOR IS FULLY DISENGAGED OR DAMAGE TO THE CONNECTORS WILL OCCUR.

(2) Cut and remove the lock wire, release the knurled knob and remove the computer from the mounting tray.

(3) Install protective caps and/or covers to the electrical connectors.

C. Installation

(1) Remove the protective caps or covers installed at paragraph 1.B.(3).

CAUTION: MAKE SURE THE PINS ARE IN CORRECT ALIGNMENT TO AVOID DAMAGE TO THE CONNECTOR.

(2) Install the computer to the mounting tray, tighten the knurled knobs and wirelock to the mounting tray.

(3) Install any equipment/furnishings removed to gain access to the computer paragraph 1.B.(1).

(4) Remove the safety tag and close the circuit breaker listed in paragraph1.A.

(5) Do a functional test of the EGPWS system (ADJUSTMENT/TEST).

D. Close up

(1) Make sure the work area is clean, clear of tools and any miscellaneous items of equipment.

NAVIGATION
INDEPENDENT POSITION DETERMINING
ALLIEDSIGNAL MK. V ENHANCED GROUND PROXIMITY WARNING SYSTEM (EGPWS) ADJUSTMENT/TEST

1. ADJUSTMENT/TEST

A. Preparation

NOTE: The "Actions" done are in a sequence, as well as the “Results". It is imperative the "Action" sequence is maintained for proper "Results" to be achieved. Do the test step as follows:
Read through the "Action" & 'Results" columns first.
Do the required “Actions".
Make sure of the “Results" as each “Action" is done.

NOTE: All results to a test condition may not be listed unless the result is related to this specific test.

ACTION		RESULT
(1) Energize the airplane busbars (Ref. 24-01-00, 201).		-
(2) On the RADIO SWITCH PANEL, push RADIO 1 and RADIO 2 switches to ON		On the RADIO SWITCH PANEL, RADIO 1 and RADIO 2 annunciators come ‘ON’.

B. Power on and EGPWS Status

ACTION		RESULT
(1) On panel DA-A make sure the EGPWS circuit breaker is closed		Make sure the LED status on the EGPWS unit is as follows: • EXTERNAL FAULT OFF • COMPUTER OK GREEN • COMPUTER FAIL OFF
(2) On the PFDs and MFDs push the right line select key 2({R2} LSK) to select the terrain overlay		On the PFDs and MFDs: • (C) TERR is enlarged.
(3) On the Pilot’s and Co-pilot’s DCP use the range control knob to select ranges 10, 25, 50, 100, 200 and 300		On the PFDs and MFDs: • The range scale on the terrain map varies with the knob actuation.

C. EGPWS Self Test

NOTE: The Level 1 Self-test is divided into 3 functions: (1) Preamble (2) Level 1 Short Self-test and (3) Level 1 Long Self-test. The Preamble checks if configuration errors have been detected before it starts the main self-test process. The Program Pin Parity, Airplane Configuration Database CRC, Airplane Configuration Database Compatibility and the Airplane Type are all checked before starting the Self-test. If any of these faults are detected, Self-test will annunciate the detected fault and terminate the Self-test process. The Level 1 Short Self-test is a subset of the Level 1 Long Self-test. It is a Go/No Go Test intended to provide a confidence test to show that the EGPWS is fully operational. The Level 1 Long Self-test annunciates all configured and activated alert voice messages including warning, caution and altitude callout voices. To help the navigation through all of the Self-test levels, two types of cancel sequences are supported. A ‘Short Cancel’ is defined as depressing and holding the Self-test switch for less than 2 seconds (after the Self-test sequence is initiated). Depressing and holding the Self-test switch longer than 2 seconds is a ‘Long Cancel’.

NOTE: While the EGPWS computer is in Self-test mode, The PFDs and MFDs will show TERRAIN FAIL

ACTION		RESULT
Level 1 Long Test		
(1) Push the EGPWS TEST switch for 3 seconds to start Level 1 Long Self-test		PFD 1 and 2: Shows [GPWS] [W/S] annunciation in (Y) boxed in (Y) flashing.
		Then: PFD1 and 2: [GPWS] [W/S] annunciation in (Y) boxed in (Y) are removed.
		Then: AUDIO **Glideslope**
		Then: PFD 1 and 2: Shows (Y) GND PROX flashing.
		Then: AUDIO **Pull-up**
		Then: PFD 1 and 2: Shows (R) PULL-UP flashing.
		Then: Audio **Windshear, Windshear, Windshear**
		Then: PFD 1 and 2: Shows (R) WINDSHEAR flashes followed by flashing (Y) WINDSHEAR.
		Then: AUDIO **Terrain, Terrain, Pull-up**
		Then: PFD 1 and 2: Shows (R) PULL-UP flashes followed by flashing (Y) GND PROX.

ACTION		RESULT
ACTION (1) continued		
		PFD 1 and 2: Shows [GPWS] [WS] annunciation in (Y) boxed in (Y) flashing.
		Then: AUDIO **Sink rate** **Pull up** **Terrain** **Pull up**
		Then: PFD 1 and 2: Shows [GPWS] [WS] annunciation in (Y) boxed in (Y) steady.
		Then: AUDIO **Don't sink - Don't sink** **Too low terrain** **Too low gear** **Too low flaps** **Too low terrain** **Glideslope** **Bank angle - Bank angle** **Minimums** **1000** **500** **Windshear, Windshear, Windshear** **Caution windshear** **Too low - Terrain** **Caution terrain - Caution terrain** **Terrain - Terrain - Pull up** **Caution obstacle, Caution obstacle** **Obstacle, Obstacle - Pull up**
Level 1- Short Test		

ACTION		**RESULT**
(2) Push the EGPWS TEST switch within 3 seconds after completion of the Level 1 Long Self-test to start Level 1 Short Test		PFD 1 and 2: Shows [GPWS] annunciation in (Y) boxed in (Y) flashing for 3 seconds.
		Then: PFD1 and 2: Shows flashing GND PROX in Y).
		Then: AUDIO **Glideslope**
		Then: PFD 1 and 2: Shows flashing PULL-UP in (R).
		Then: AUDIO **Pull-up**
		Then: PFD 1 and 2: Shows flashing WINDSHEAR in (R).
		Then: AUDIO **Windshear, Windshear, Windshear**
		Then: PFD 1 and 2: Shows flashing PULL-UP in (R).
		Then: AUDIO **Terrain - Terrain - Pull-up**
Level 2 - Current Faults		
(3) Push the EGPWS TEST switch within 3 seconds after completion of the Level 1 Short Self-test, and start Level 2 Test		AUDIO **Current faults** **No faults** **Push to continue**
Level 3 - System Configuration		
NOTE Record the appropriate Level 3 - System Configuration callouts on System Configuration (Table 501).		

ACTION		**RESULT**
(4) Push the EGPWS TEST switch within 3 seconds after completion of the Level 2 Tests, and start Level 3 Test		AUDIO **System Configuration** **Part Number** 965-0976-0xx-xxx-xxx **Mod Status** 7 **Serial Number** xxxx **Application software version** 212.xx **Configuration software version** 212 **Terrain database version** 42x **Envelope mod database version** B02 **Boot code version** B101.x **Airplane type** 176 **Audio menu** 0 **Altitude callout menu** 14 **Dual GPS selected** **Windshear caution w/voice selected** **Bank angle selected** **Peaks enabled** **Mod 6 low volume selected** **Obstacle awareness enabled**
Level 4 - Fault History		
(5) Push the EGPWS TEST switch within 3 seconds after completion of the Level 3 Test, and start Level 4 Test		-
Level 5 - Warning History		
(6) Push the EGPWS TEST switch within 3 seconds after completion of the Level 4 Test, and start Level 5 Test		AUDIO Reports any alerts recorded over the last ten flight legs.
Level 6 - Discrete Input Test		
(7) Push the EGPWS TEST switch within 3 seconds after completion of the Level 5 Test, and start Level 6 Test.		-
(8) Push the FLAP OVRD switch		SWITCH OVRD will come ON. AUDIO LANDING FLAPS is heard.

ACTION		RESULT
(9) Push the FLAP OVRD switch again		SWITCH OVRD will go OFF AUDIO NOT LANDING FLAPS is heard.
(10) Push the TERRAIN INHIBIT switch		SWITCH INHIBIT will come ON AUDIO TERRAIN OFF is heard.
(11) Push the TERRAIN INHIBIT switch again		SWITCH INHIBIT will go OFF AUDIO TERRAIN ON is heard.
(12) Push the G/S INHIBIT switch		AUDIO GLIDESLOPE CANCEL is heard.
(13) Push the G/S INHIBIT switch again		AUDIO GLIDESLOPE ENABLE is heard.
(14) Push the ALT CALLOUTS switch		SWITCH INHIBIT will come ON AUDIO CALLOUTS DISABLED is heard.
(15) Push the ALT CALLOUTS switch again		-
NOTE After a few seconds DISCRETE INPUT TEST PUSH TO CANCEL will be heard.		
(16) Push EGPWS TEST switch		PFD 1 and 2: [GPWS] [WS] annunciation in (Y) boxed in (Y) are removed.

Table 501
System Configuration Table

Part Number	965-0976-0__
Mod. Status	
Serial Number	
Application Software Version	
Configuration Software Version	
Terrain Database Version	
Envelope Mod. Database Version	
Boot Code Version	
Airplane Type	
Audio Menu	
Altitude Callout Menu	

D. Close Up

(1) On RADIO SWITCH PANEL push RADIO 1 and RADIO 2 to OFF.

(2) De-energize the airplane busbars (Ref. 24-01-00, 201).

NAVIGATION
DEPENDENT POSITION DETERMINING
DISTANCE MEASURING EQUIPMENT (COLLINS DME-442/DME-4000)
DESCRIPTION AND OPERATION

1. INFORMATION

There are two different Distance Measuring Equipment (DME) Systems that can be installed in this airplane:

- Collins DME-442 **(Effectivity: Airplanes Prior to Serial No. 258744 without Kits AAC-0409 and AAC-0410).**
- Collins DME-4000 **(Effectivity: Airplane Serial No. 258744 and After or airplanes with Kits AAC-0409 and AAC-0410).**

This has no effect on the DME system Description or Operation but some component locations change between system installations.

2. GENERAL SYSTEM DESCRIPTION

The Distance Measuring Equipment (DME), airborne and ground, is used to measure, in nautical miles, the slant distance of an airplane from the DME navigational aid. DME is limited to line-of sight but can be affected by the type of terrain.

When used in conjunction with the VHF Omnidirectional Range (VOR) system (VOR/ILS NAVIGATION SYSTEM) the DME makes it possible to pinpoint, almost the exact geographical position of the airplane.

The VOR and DME ground stations are often co-located and are given the same morse ident code although the DME signal is transmitted at a slightly higher pitch and at less frequent intervals - approximately every 30 seconds.

To initiate the cycle, the DME transceiver transmits a pulse of UHF energy through the DME antenna. The pulse is called an interrogating signal because it ‘interrogates’, or asks, the ground station for a reply. The ground station, which is a transponder, responds to the interrogation by transmitting a corresponding pulse back to the airplane’s transceiver through the DME antenna.

The round trip from the airplane’s DME transceiver to the ground station and back to the transceiver is a cycle. The amount of time it takes to complete the cycle is determined by how far the two are apart. The transceiver ‘looks’ at the amount of time the cycle took, translates that into nautical miles, and displays the result to the pilots’ displays. The transceiver also computes the relative closure rate which allows the display of time-to-station and groundspeed (in knots). The ground station identifier is also displayed.

The DME measures the slant distance to the ground station therefore the distance displayed is not the actual ground distance. The difference between the ground and slant distance is small at low altitudes and long distances but increases with increased height and shorter distances.

3. AIRPLANE SYSTEM DESCRIPTION

The airplane has a dual DME installation which is a ‘three channel’ distance measuring equipment.

When a dual DME system is installed (DME-442 Ref. Figure 1, Sht 1 or DME- 4000 Ref. Figure 1, Sht 2 and Figure 2), the No.1 DME is manually tuned by the left CDU (Control Display Unit) and the No.2 DME is manually tuned by the right CDU. Either DME can be tuned by its cross-side CDU. Channels two and three, of each system, are automatically tuned by the FMS navigator and used for multisensor navigation. Data, from each system is also supplied to the airplane audio system, the Integrated Avionics Processor System (IAPS) and the Electronic Flight Instrumentation System (EFIS).

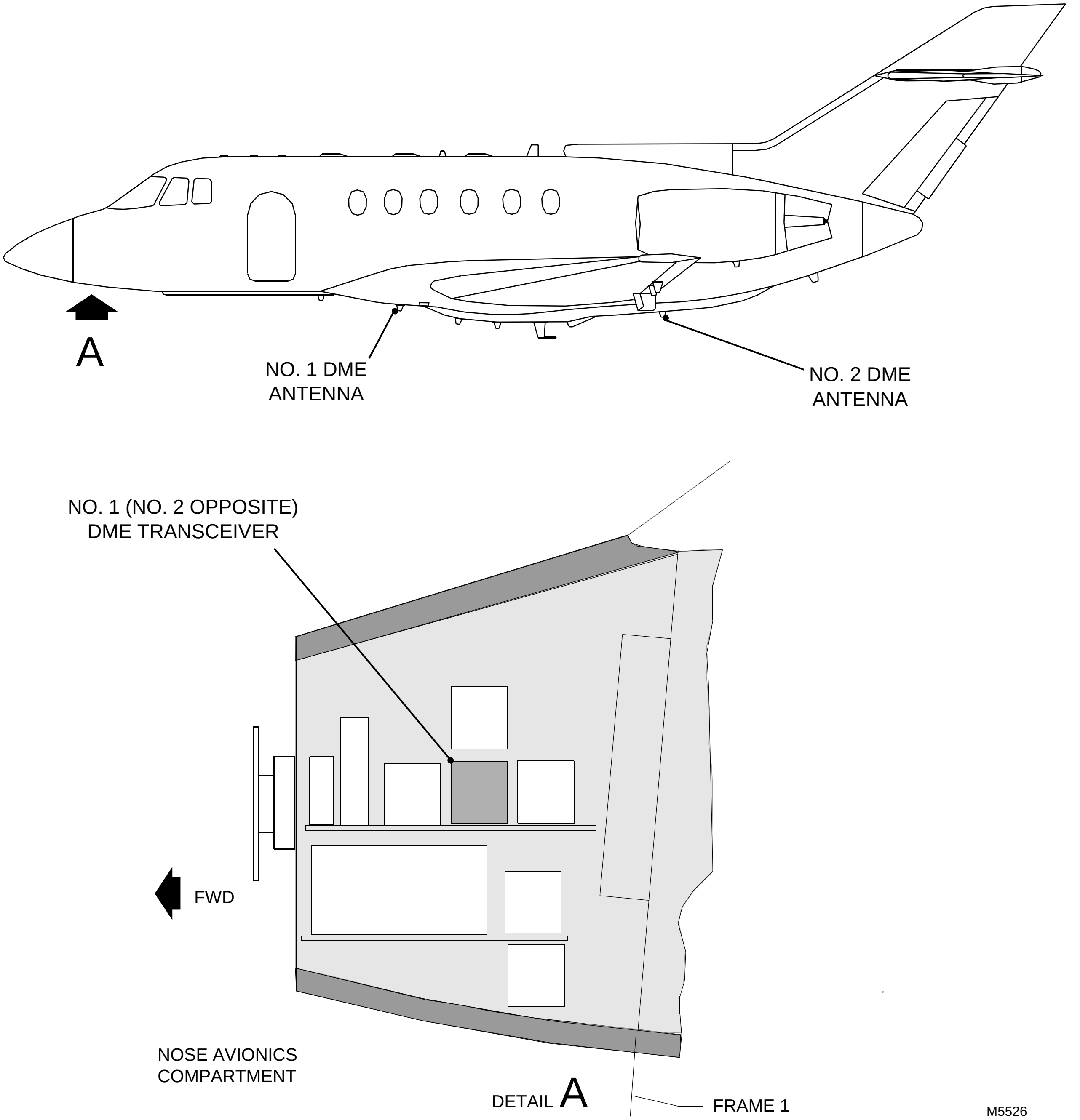


Figure 1 (Sheet 1 of 2)
DME Components - Location
(Effectivity: Airplanes Prior to Serial No. 258744 without Kits AAC-0409 and AAC-0410)

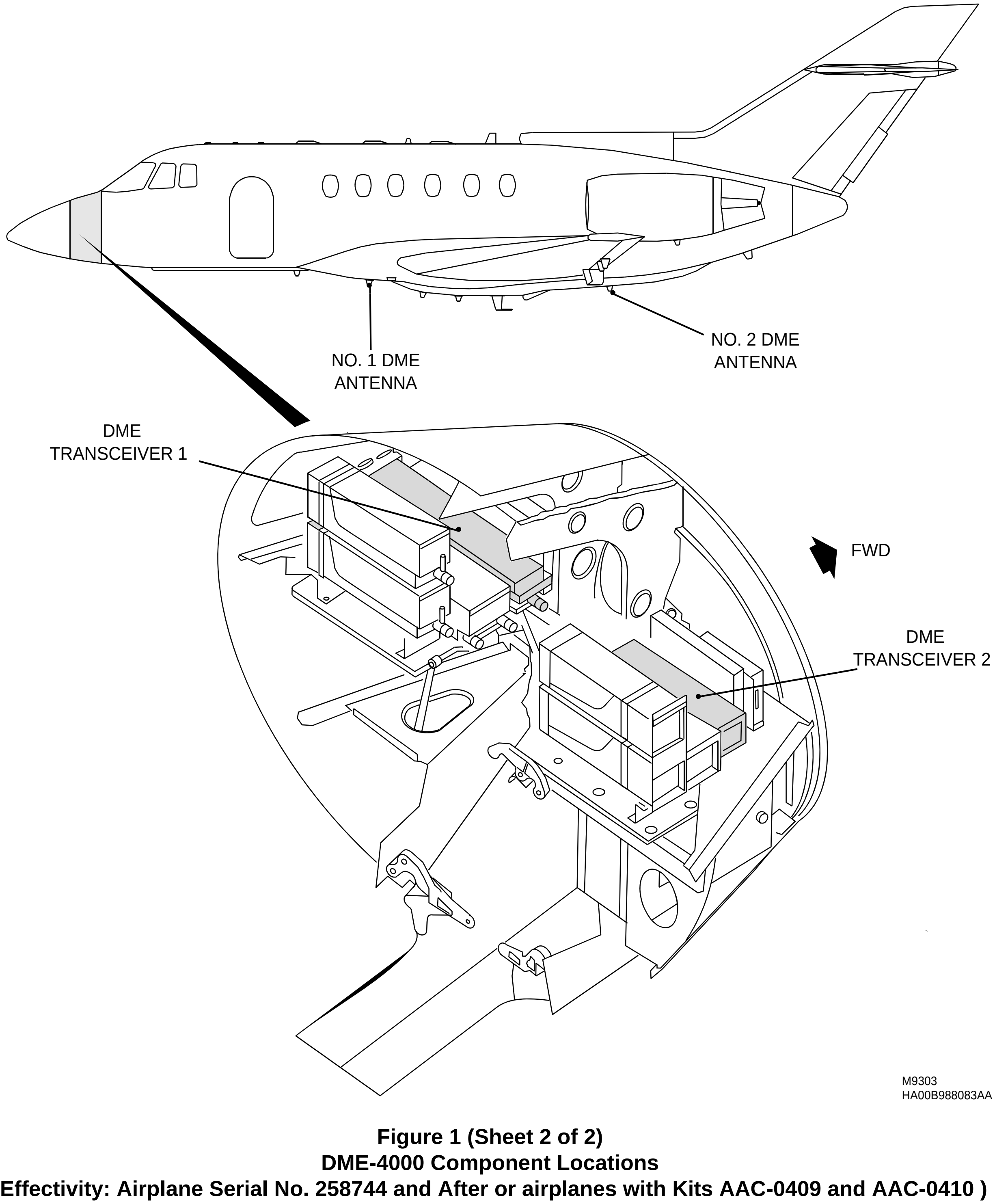


Figure 1 (Sheet 2 of 2)
DME-4000 Component Locations
(Effectivity: Airplane Serial No. 258744 and After or airplanes with Kits AAC-0409 and AAC-0410)

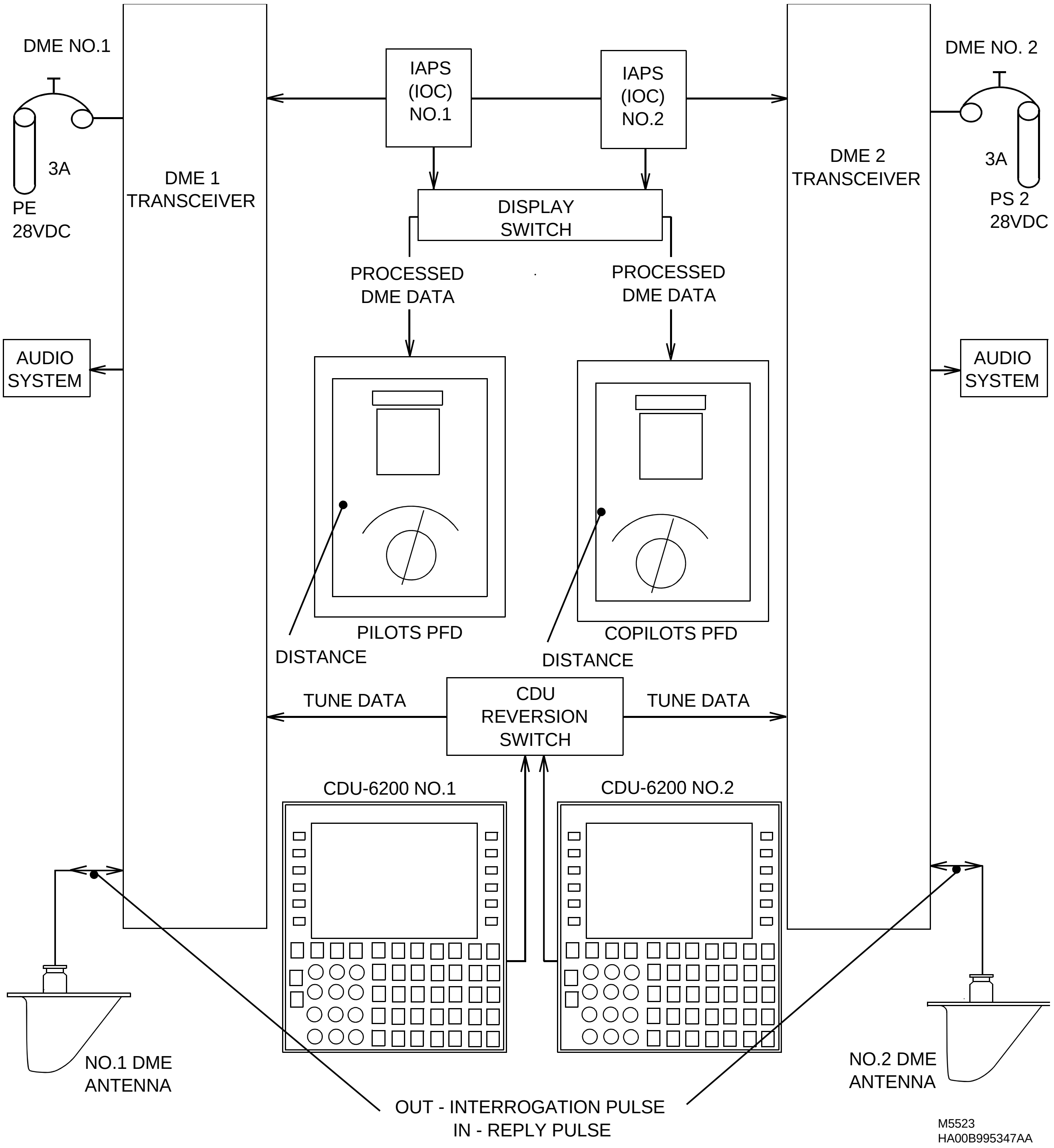


Figure 2
Dual DME System

The left and the right audio control panels have DME-1 and DME-2 controls. To turn the DME audio on, the related DME control must be pulled-out and turned if volume adjustment is required. With dual DME installed, the DME-1 and the DME-2 control the audio from the number 1 channel of each transceiver. For further information (Ref. 23-50-10, 001).

4. OPERATION

The No.1 DME transceiver is supplied with 28 volts DC from the PE 28VDC busbar.

The No. 2 DME transceiver is supplied with 28 volts DC from the PS2 28VDC busbar.

Two Control Display Units (CDU 6200) are used to tune the DME (Ref. Figure 3). Each CDU supports full reversion tuning of the cross-side DME.

To tune a DME radio, push the TUN button, on the CDU, to access the TUNE page, enter the desired frequency, preset number or identifier of the DME ground station on the scratchpad line - then push the line select key next to the DME 1 or DME 2 label. The DME can also be tuned from the NAV CONTROL page.

Further information on the operation of the CDU’s is covered in (Ref. 34-60-05, 001).

If you select DME HOLD on the CDU TUNE page, the IDENT/FREQ is replaced by a HOLD annunciation.

The left Primary Flight Display (PFD) and the right PFD show the airplane slope distance from the tuned ground station (Ref. Figure 4). For further information on the DME screen displays (Ref. 34-60-35, 001).

Channel 1 of the DME transceivers are manually tuned by the on-side CDU but can also be tuned by the cross-side CDU by selecting the CDU reversion switch mounted on the bottom of the left and right instrument panels. When the switch is in the CDU position each CDU controls its own side system. If the switch is pushed to the REV position the cross-side CDU is switched OFF and the on-side CDU will control both the No.1 and No.2 systems.

Channel 2 and channel 3, of the transceiver, are automatically tuned by the Flight Management Computer (FMC) for multisensor navigation. The DME audio output is applied to the airplane audio system. DME data is also applied to the IAPS and EFIS.

When DME interrogates a ground station the diplexer circuit, in the transceiver, isolates it to prevent possible damage to other L-band receivers on the airplane.

When the ground station transmits a reply the diplexer circuit isolates the antenna from the other transmitter circuits.

NOTE: Optional extended range tuning and independent tuning are selectable via changes in the Central strapping unit (CSU).

5. COMPONENTS

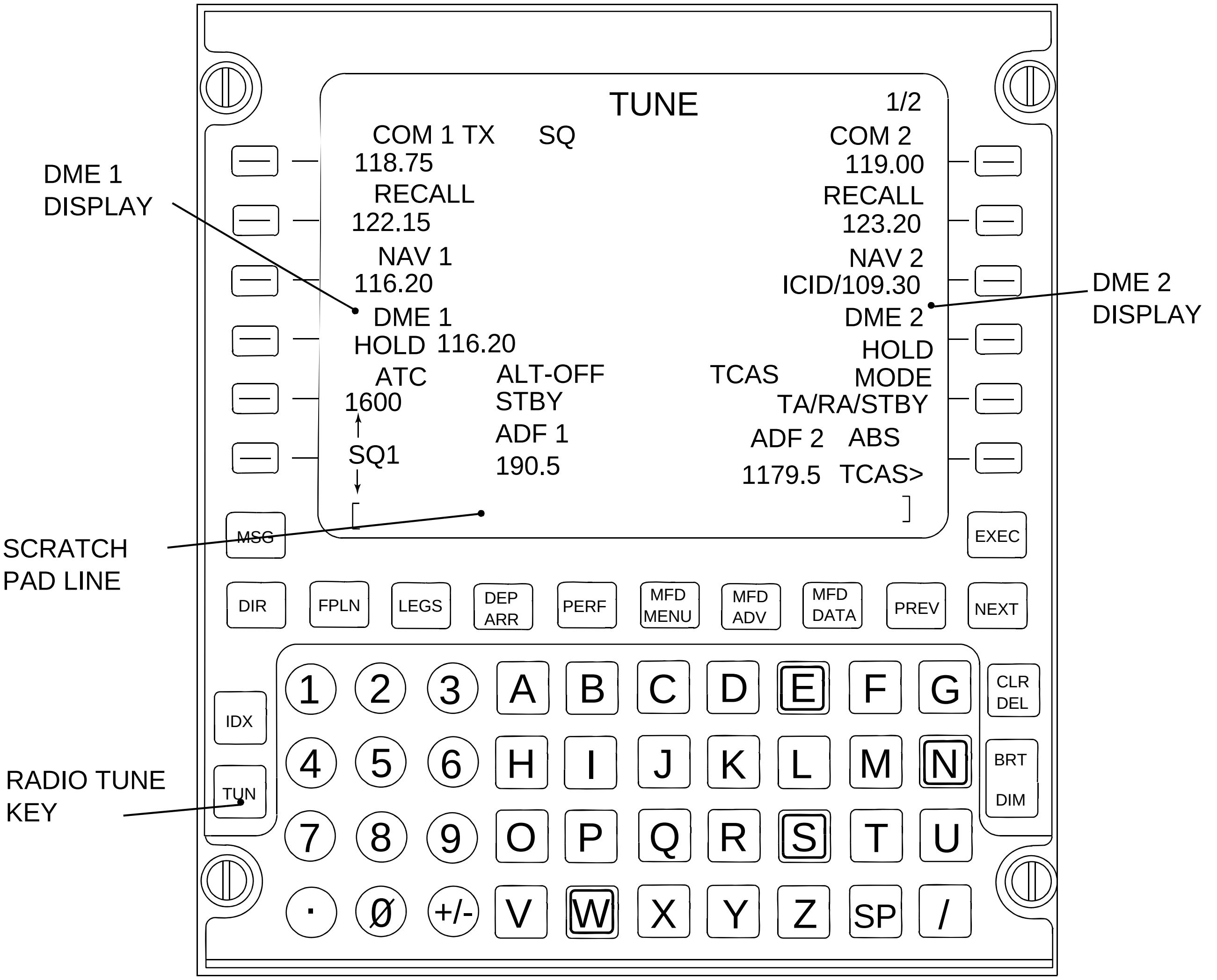
DME Transceiver:

The DME is a 3 channel transceiver that measures the slant range distance from the airplane to a ground station, computes the relative closure rate and time-to-station, and decodes the station identifier.

The No.1 Transceiver and the No.2 Transceiver are located in the nose avionics compartment (DME-442 Ref. Figure 1, Sht 1 or DME- 4000 Ref. Figure 1, Sht 2).

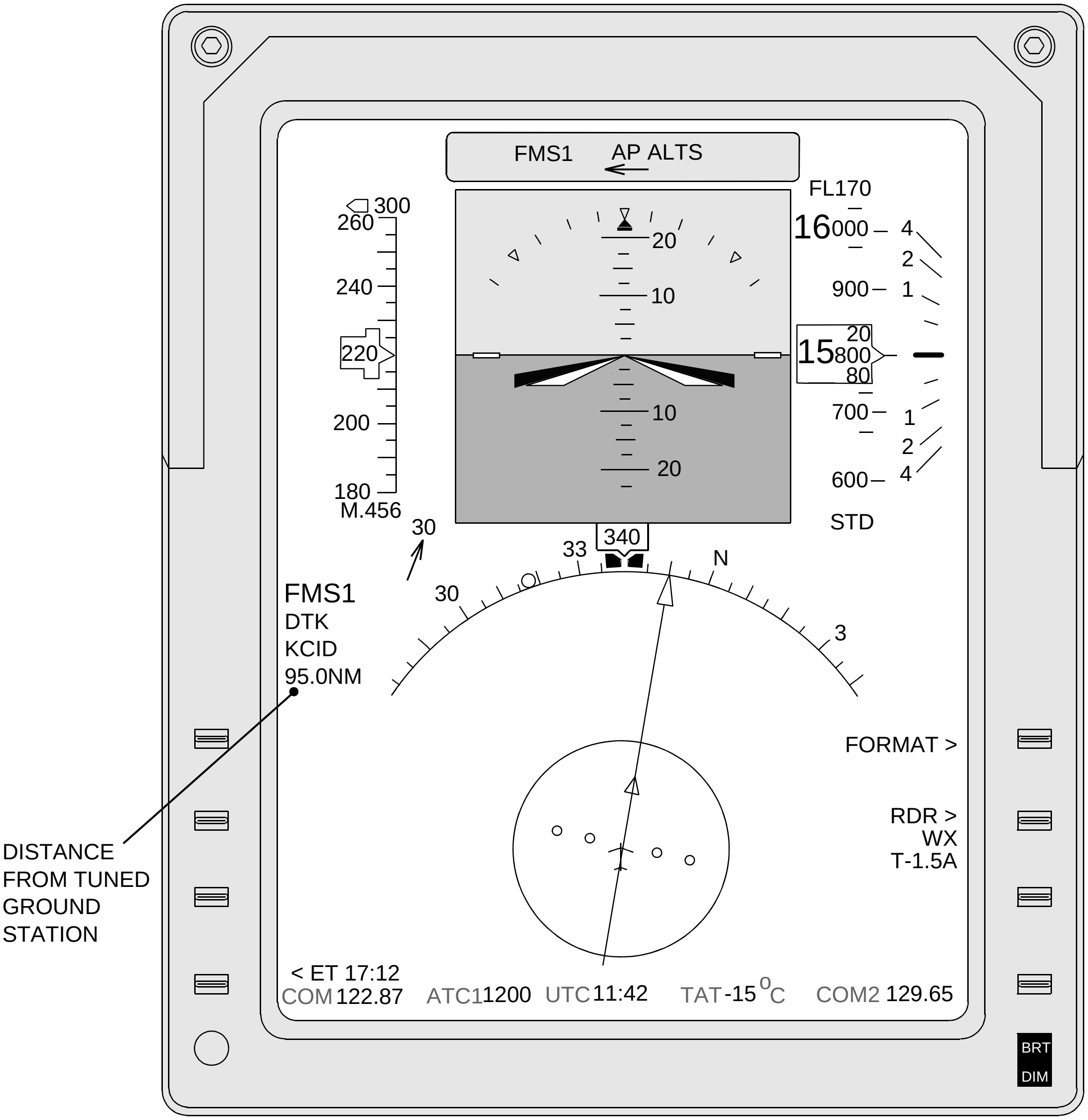
L-Band Antenna:

The DME 1 blade antenna is located on the underside of the fuselage (DME-442 Ref. Figure 1, Sht 1 or DME-4000 Ref. Figure 1, Sht 2), just forward of the wing. The DME 2 blade antenna is positioned on the underside of the fuselage to the rear of the rear of the wing. The spacing between the antennas is sufficient to diminish any mutual interference.



M5525
HA00B995349AA

Figure 3
Control Display Unit



M5524/1
HA00B995348AA

Figure 4
PFD-DME Indications

NAVIGATION
DEPENDENT POSITION DETERMINING
DISTANCE MEASURING EQUIPMENT (COLLINS DME-442/DME-4000) REMOVAL/INSTALLATION

1. INFORMATION

Equipment/Material	**Part/Item No.**
Cleaner, Solvent	201 (Chapter 20-95-201)
Polysulfide, Sealant	313 (Chapter 20-95-301)
Aluminum wool	Local supply

A. Preliminary Procedures

(1) Open, safety clip and tag the circuit breakers that follow (Ref. 24-01-00, 201).

Panel	**Label**
DA-A	DME 1
DA-A	DME 2

2. DISTANCE MEASURING EQUIPMENT (DME)

A. DME Transceiver Removal

	MECH	**INSP**
(1) Do the preliminary procedures (paragraph 1.A.).		
(2) Open the nose gear doors (Ref. 32-20-42, 301).		
CAUTION *Do not lift the transceiver up, or move from side to side until the rear connectors are completely disengaged. This is to prevent damage to the connector pins.* (3) Remove the locking wire and slacken the securing clamps; slide the unit straight out from the mount.		
(4) Install protective caps or covers to the electrical connectors.		

B. DME Transceiver Installation

	MECH	**INSP**
(1) Remove the protective caps or covers from the electrical connectors.		
(2) Carefully slide the unit squarely into the mount until the rear connectors are correctly mated. Engage and tighten the securing clamps and wirelock.		
(3) Close the nose gear doors (Ref. 32-20-42, 301).		

	MECH	INSP
(4) Remove the safety clips and tags, and close the circuit breakers opened in paragraph 1.A. (Ref. 24-01-00, 201).		
(5) Do the test procedure for the DME 1 (DME 2) system (Ref. 34-50-05, 501).		

C. Antenna Removal

	MECH	INSP
(1) Do the preliminary procedures (paragraph 1.A.).		
(2) Remove the bolts which attach the mounting plate assembly to the fuselage. Note the position of the mounting plate assembly.		
(3) Remove the mounting plate assembly and disconnect the co-axial cable connector from the antenna.		
(4) Install protective caps and covers to the antenna connections.		
(5) Remove the screws and nuts which attach the antenna to the mounting plate. Note the position of the antenna on the mounting plate and remove the antenna from the plate.		

D. Antenna Installation

	MECH	INSP
(1) Make sure that the bonding areas of the securing bolts and screws, antenna and mounting plate mating surfaces are have no deterioration, deposits and contamination.		
(2) Clean the mating surfaces of the antenna and its mounting position on the access door with cleaner (Item 201) and aluminum wool.		
(3) Position the antenna on the mounting plate, as noted in paragraph 2.C.(5), and attach with screws and nuts. seal the periphery of the antenna and the tip of the screws with Polysulfide sealant (Item 313).		
(4) Remove the cap and cover from the connectors and attach the co-axial cable to the antenna.		
(5) Position the mounting plate assembly as noted in paragraph 2.C.(2) and attach the with bolts.		
CAUTION *Make sure that the in and out of wind tolerance of the mounting plate is within 0.02 in.* (6) Seal the periphery of the mounting plate and the top of the securing bolts with Polysulfide sealant (Item 313).		
(7) Remove the safety clips and tags, and close the circuit breakers opened in paragraph 1.A.		
(8) Do the test procedure for the DME 1 (DME 2) system (Ref. 34-50-05, 501).		

E. Close Up

(1) Make sure the work area is clean, clear of tools and any other items of equipment.

NAVIGATION
DEPENDENT POSITION DETERMINING
DISTANCE MEASURING EQUIPMENT (COLLINS DME-442/DME-4000) ADJUSTMENT/TEST

1. DME SYSTEM

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the DME 1 (DME 2) system as necessary.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the DME 1 (DME 2) system as necessary.

AUTOMATIC DIRECTION FINDER (COLLINS ADF-462) - DESCRIPTION AND OPERATION

1. Description *(Figure 1 and Figure 2)*

The purpose of the automatic direction finder (ADF) is to 'point' in the direction of the non-directional beacon (NDB) that is being tuned. The ADF is the airborne unit used to navigate between NDB's.

NDBs operate in the medium frequency band (200 kHz to 500 kHz) and radiate an uninterrupted carrier, modulated at regular intervals by a tone keying the callsign of the beacon in international morse code. A NDB may be used in the vicinity of an airport as an airfield or instrument landing system (ILS) locator, in association with a VOR ground station, or alone.

ADF-462 Receiver

The ADF-462 is a low/medium frequency radio receiver that computes the bearing to a tuned station. Two control display units (CDU-6200) are used to tune the ADF. Each CDU supports full reversion tuning to the cross-side ADF. The audio output is applied to the airplane audio system and digital bus outlets are applied to the IAPS and the EFIS system.

The pilot's and co-pilot's audio control panel have ADF-1 and ADF-2 controls. To turn the ADF audio on, the related ADF-1/ADF-2 control must be pulled-out and turned if volume adjustment is required. For further information refer to Chapter 23, AUDIO INTEGRATING SYSTEM.

ANT-462B Antenna

The ANT-462B antenna is mounted on the upper fuselage and has dual circuits which consist of a sense antenna, two loop antennas and an output transformer. Each antenna has processing circuits that resolve induced voltages into the RF signal output used to measure the arrival direction of the received signal. Processing circuits in the ADF receiver convert these induced voltages into bearing information. This bearing information is sent to the No.1 PFD and No.2 PFD through the Integrated Avionics Processor System (IAPS).

NOTE: Only one antenna output circuit is used with the single ADF installation.

2. Operation *(Figure 3, Figure 4)*

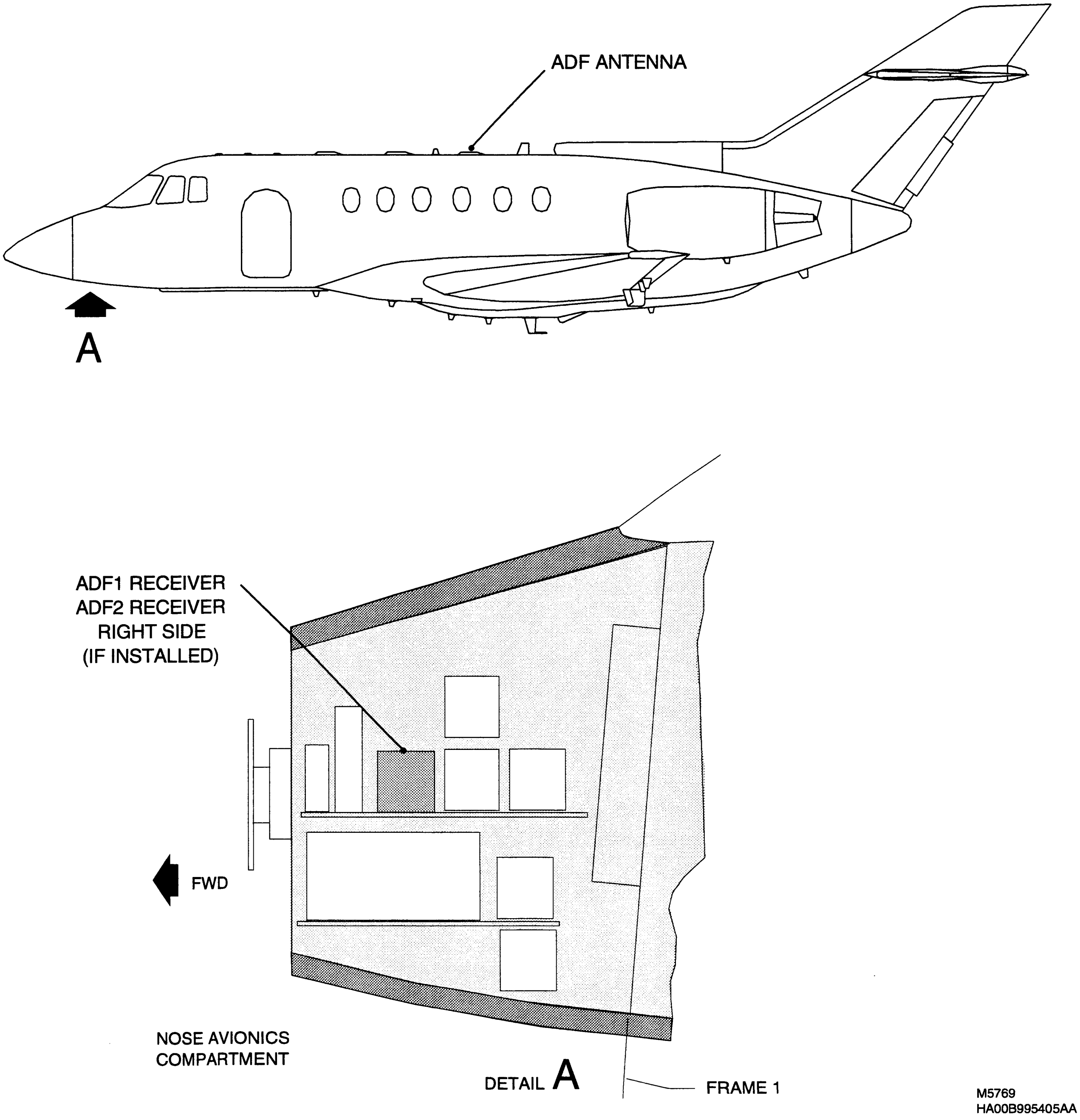
This airplane has a single Collins ADF-462, with the option of a dual installation, which is part of the Collins Radio Sensor System (RSS) that includes all of the communication and navigation radios except the HF.

The No.1 ADF receiver is supplied with 28volts DC from PE bus.

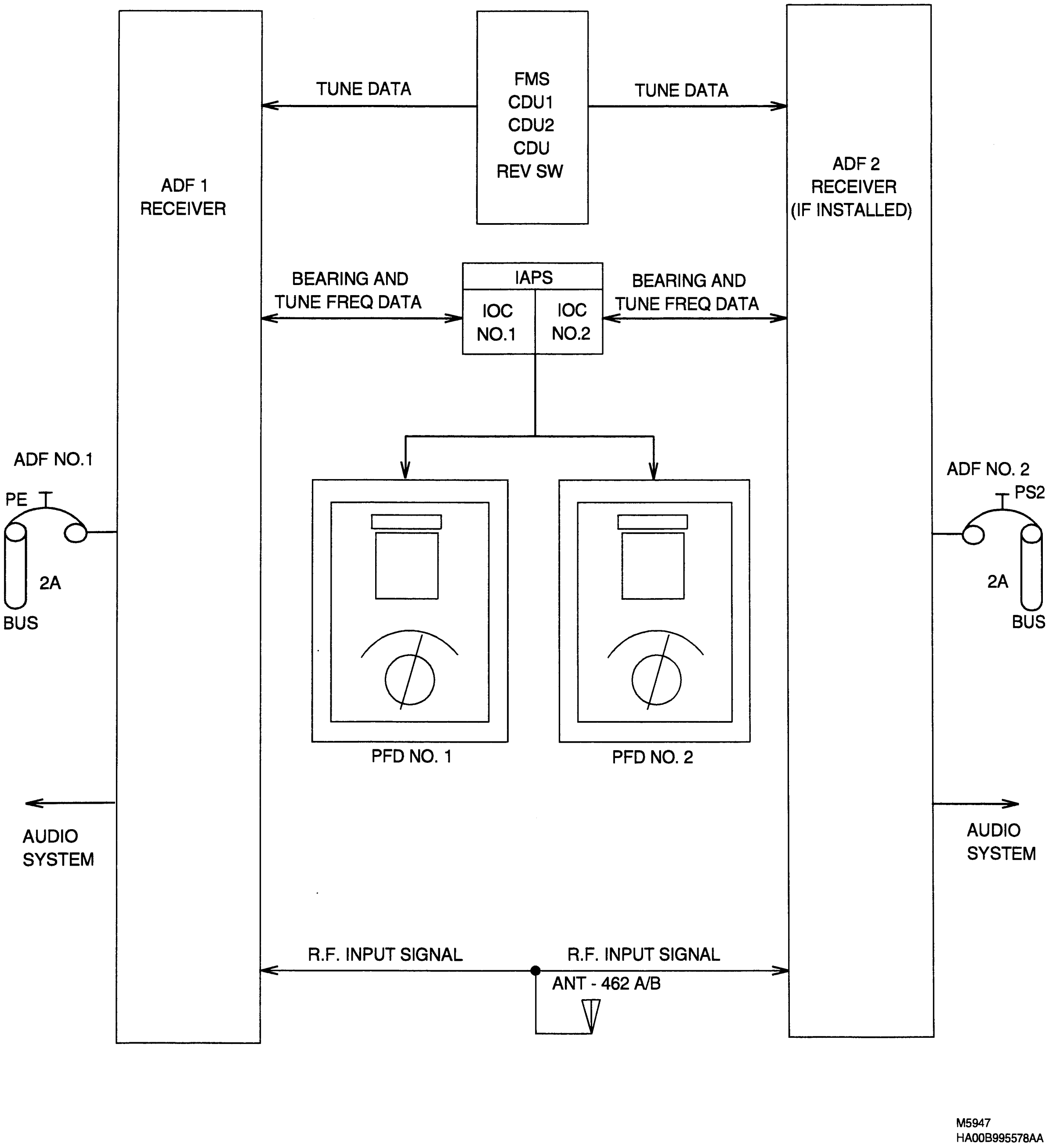
The No.2 ADF receiver (if installed) is supplied with 28 volts DC from PS2 bus.

Two control display units (CDU-6200) are used to tune the ADF.

To tune the ADF, push the TUN button on either CDU, to access the TUNE page. At the bottom of the TUNE page, enter the desired frequency or preset number onto the scratchpad line, then push the ADF line select key (LSK) to transfer this information to the selected field. If the information is valid, it displays (green) in the data field and the radio immediately retunes. The ADF active frequency shows green for



ADF Receivers and Antennas - Location
Figure 1



ADF System Overview
Figure 2

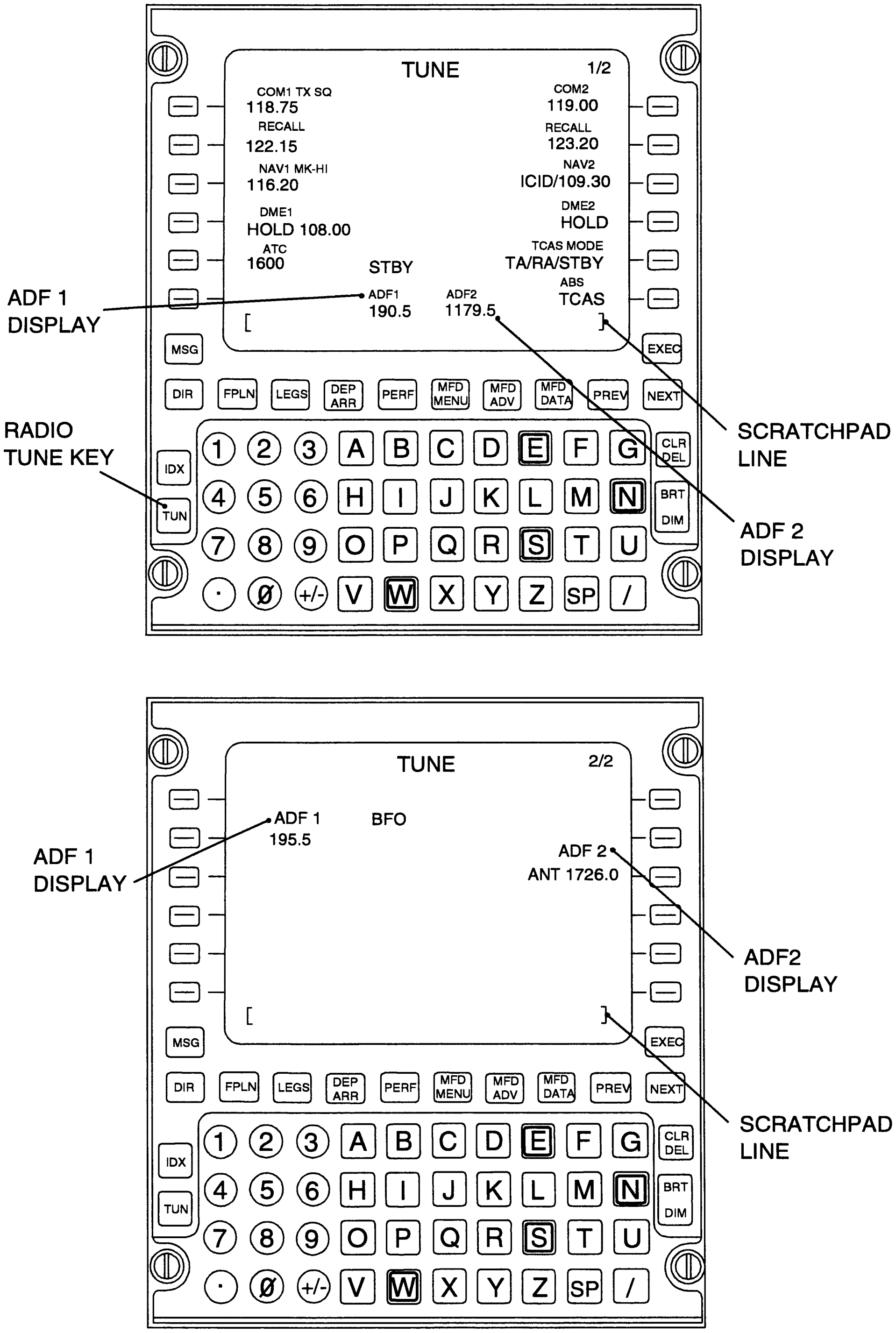
approximately 3 seconds after entry and whenever the CDU command frequency matches the frequency from the radio. If the radio frequency does not match the commanded frequency, the frequency shows amber. Push the ADF LSK again to view the ADF CONTROL page.

If dual ADFs are installed, push the NEXT function key to access TUNE page 2 - then push the ADF LSK to view the ADF CONTROL page.

NOTE: When TCAS is enabled through configuration strapping and two ADF radios are installed, the active ADF 1 frequency is shown, but not controlled, on the first tune page. All ADF 1 and ADF 2 radio control occurs on the second TUNE page. If only one ADF radio is installed, the ADF radio is shown and controlled on the first TUNE page.

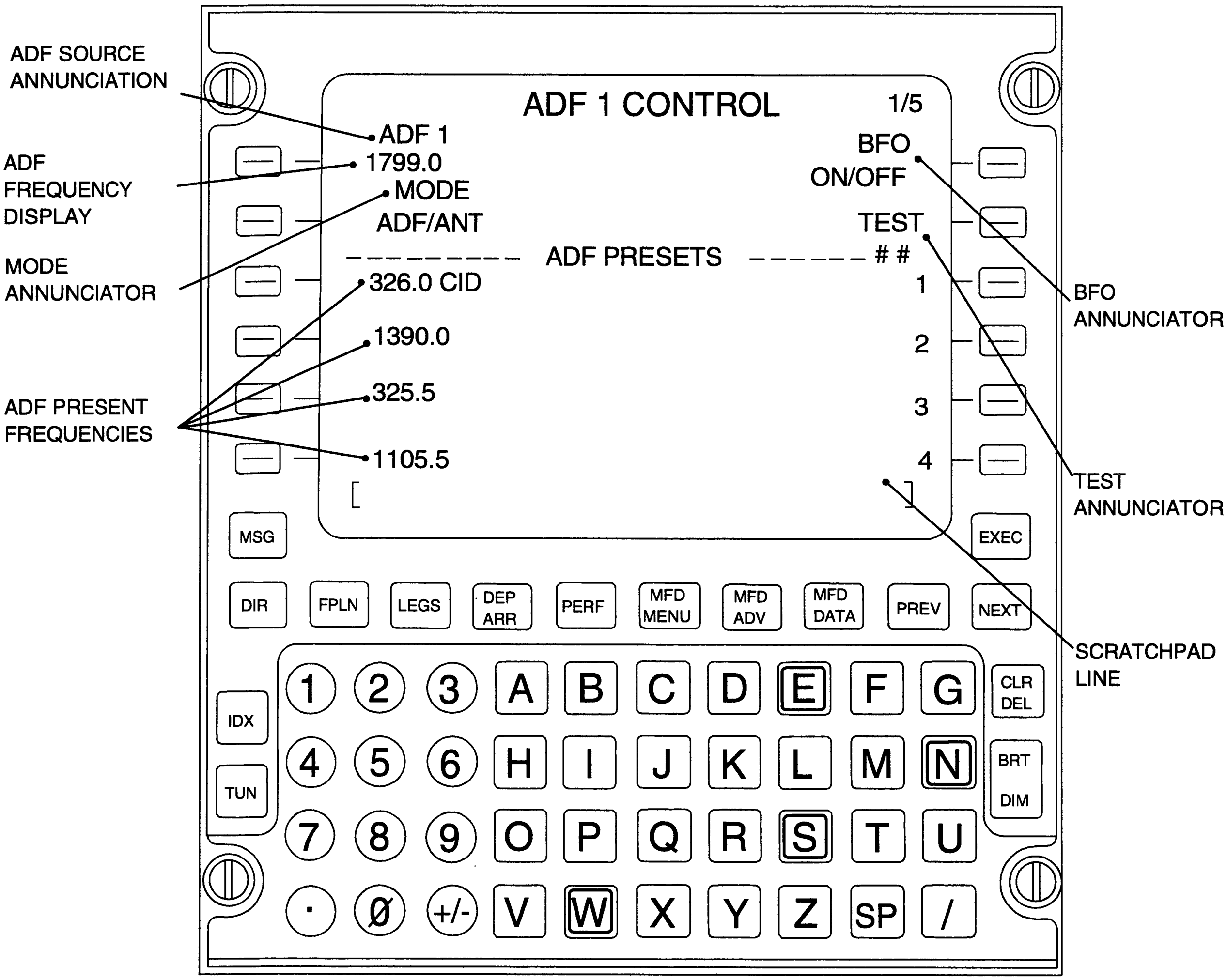
The ADF CONTROL screen annunciations, controls and displays:

ADF Source Annunciator ...	The ADF source annunciator shows the active radio. The ADF 1 source annunciator means the CDU is controlling a No.1 (left side) radio.
ADF Active Frequency display ...	This display shows the active ADF radio frequency. Enter the desired frequency or preset number onto the scratchpad line - then push the ADF LSK to transfer this frequency to the selected field. If the frequency is valid, it displays in (green) in the data field and the radio immediately retunes.
Mode Line Key and Annunciator ...	Push the mode LSK to alternately select the ADF or ANT (antenna) mode. The annunciator that shows larger and is colored cyan is selected. In the ADF mode, the radio provides bearing-to-the-station and aural outputs. In the ANT mode the radio provides only an aural output.
BFO Line Key and Annunciator ...	Push the BFO (beat frequency oscillator) LSK to alternately select On or deselect OFF BFO mode operation. The annunciation that is larger and colored cyan is the selection. When BFO is selected the ADF radio generates a 1 000 Hz aural BFO tone when a keyed cw signal is received.
TEST Line Key ...	Push the TEST LSK to start the ADF radio self-test routine. The TEST annunciator becomes larger while the ADF test is on.
ADF PRESETS Display ...	The numbered ADF PRESETS display has up to 20 preset ADF frequencies. Push the NEXT or PREV function key to select the next or previous preset page and the associated LSK to transfer the numbered preset frequency to the NAV active frequency field. To create or modify an ADF PRESETS frequency, enter the desired frequency and/or identifier onto the scratchpad line - then push the associated numbered LSK to transfer this frequency to the numbered preset frequency field. If the frequency is valid, it shows in the data field.



M5786
HA00B995422AA

Radio Tune Page
Figure 3



M5785
HA00B995406AA

ADF Control Page
Figure 4

AUTOMATIC DIRECTION FINDER (COLLINS ADF-462) - REMOVAL/INSTALLATION

1. Automatic Direction Finder

A. Preliminary Procedures

(1) Open and safety tag the circuit breaker that follows (Chapter 24, ELECTRICAL POWER):

Panel	Label
DA-A	ADF 1
DA-A	ADF 2 (If installed)

B. ADF Receiver removal

(1) Open the nose gear bay doors (Chapter 32, NOSE GEAR DOORS - SERVICING).

CAUTION: DO NOT LIFT THE RECEIVER UP, OR MOVE FROM SIDE TO SIDE UNTIL THE REAR CONNECTORS ARE COMPLETELY DISENGAGED. THIS IS TO PREVENT DAMAGE TO THE CONNECTOR PINS.

(2) Remove the locking wire and slacken the securing clamps; slide the ADF 1 unit straight out from the mount.

(3) Install protective caps and covers to the electrical connectors.

C. Installation

(1) Remove the protective caps and covers from the electrical connectors.

(2) Carefully slide the ADF 1 unit squarely into the mount until the rear connectors are correctly mated. Engage and tighten the securing clamps and wirelock.

(3) Close the nose gear bay doors (Chapter 32, NOSE GEAR DOORS - SERVICING).

(4) Remove the safety tag and close the circuit breaker listed in 1.A. (Chapter 24, ELECTRICAL POWER).

(5) Do a test of the ADF system (ADJUSTMENT/TEST).

D. Antenna removal

(1) Do the preliminary procedure in paragraph 1.A. (1).

(2) Locate the antenna, remove the sealant from the counterbore and then remove and retain the six bolts.

(3) Carefully move the antenna assembly away from the fuselage, disengage and release the electrical connector. Install a blank to the electrical connector.

(4) Remove the antenna assembly.

(5) Remove the sealant sheet from the antenna or fuselage as applicable and discard.

E. Antenna installation

Equipment/Materials	Part/Item No.
Release agent	223 (Chapter 20-95-201)
Polysulphide Polymer	313 (Chapter 20-95-301)
Cleaner/solvent (MPK)	201 (Chapter 20-95-201)
Thiokol sheet seal	Part No. 25-8FC357-29

(1) Use cleaner/solvent (Item 201) to remove any sealant that remains on the airplane skin, and from the base of the antenna if the same antenna is to be installed.

(2) Prepare the new Thiokol sheet seal (Part No. 25-8FC357-29) for installation to the antenna base and to the airplane skin. Trim to size and shape, and pierce as necessary to align with the holes and rivet heads.

(3) Apply a thin layer of release agent (Item 223) to the mating surfaces of the antenna base and the airplane skin (Chapter 20, APPLICATION OF SODIUM ALGINATE RELEASE AGENT).

(4) Install the trimmed Thiokol sheet seal to the antenna base, and brush-apply the Polysulphide Polymer (Item 313) to the seal/skin mating face (Chapter 20, SEALING OF PRESSURE CABINS).

(5) Remove the blank and connect the electrical connector to the antenna.

(6) Position the antenna assembly over its mounting holes and attach the antenna assembly to the fuselage with the six bolts, retained at paragraph 1.D.(2), tighten evenly.

(7) Apply parting agent (Item 223) to the internal surface of the counterbores and fill flush with Polysulphide Polymer (Item 313). Use cleaner/solvent (Item 201) to clean any sealing compound that has come from between the antenna base and the airplane skin.

(8) Remove the safety tag and close the circuit breakers opened in paragraph1.A. (Chapter 24, ELECTRICAL POWER).

(9) Do a test of the ADF system (ADJUSTMENT/TEST).

F. Close up

(1) Make sure the work area is clean, clear of tools and other miscellaneous items of equipment.

NAVIGATION
DEPENDENT POSITION DETERMINING
AUTOMATIC DIRECTION FINDER (COLLINS ADF-462) ADJUSTMENT/TEST

1. AUTOMATIC DIRECTION FINDER

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the ADF system and antenna.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the ADF system and antenna.

NAVIGATION
DEPENDENT POSITION DETERMINING
AUTOMATIC DIRECTION FINDER (COLLINS NAV-4000)
DESCRIPTION AND OPERATION

1. INFORMATION
(EFFECTIVITY: AIRPLANE SERIAL NO. 258744 AND AFTER OR AIRPLANES WITH KITS AAC-0409 AND AAC-0410)

2. DESCRIPTION

The purpose of the automatic direction finder (ADF) is to ‘point’ in the direction of the non-directional beacon (NDB) that is being tuned. The ADF is the airborne unit used to navigate between NDBs (Ref. Figure 1 and Figure 2).

NDBs operate in the medium frequency band (200 kHz to 500 kHz) and radiate an uninterrupted carrier, modulated at regular intervals by a tone keying the callsign of the beacon in international morse code. A NDB may be used in the vicinity of an airport as an airfield or instrument landing system (ILS) locator, in association with a VOR ground station, or alone.

ADF Receiver

The ADF is a low/medium frequency radio receiver that computes the bearing to a tuned station. The ADF receiver is part of the NAV-4000 LRU, which also contains the VOR/ILS/MB elements of the navigation system. Two control display units (CDU-6200) are used to tune the ADF. Each CDU supports full reversion tuning to the cross-side ADF. The audio output is applied to the airplane audio system and digital bus outlets are applied to the IAPS and the EFIS system.

The pilot’s and co-pilot’s audio control panel have ADF-1 and ADF-2 controls (if ADF-2 option is installed). To turn the ADF audio on, the related ADF-1/ADF-2 control must be pulled-out and turned if volume adjustment is required. For further information (Ref. 23-50-10, 001).

ANT-462B Antenna

The ANT-462B antenna is mounted on the upper fuselage and has dual circuits which consist of a sense antenna, two loop antennas and an output transformer. Each antenna has processing circuits that resolve induced voltages into the RF signal output used to measure the arrival direction of the received signal. Processing circuits in the ADF receiver convert these induced voltages into bearing information. This bearing information is sent to the No.1 PFD and No.2 PFD through the Integrated Avionics Processor System (IAPS).

NOTE: Only one antenna output circuit is used with the single ADF installation.

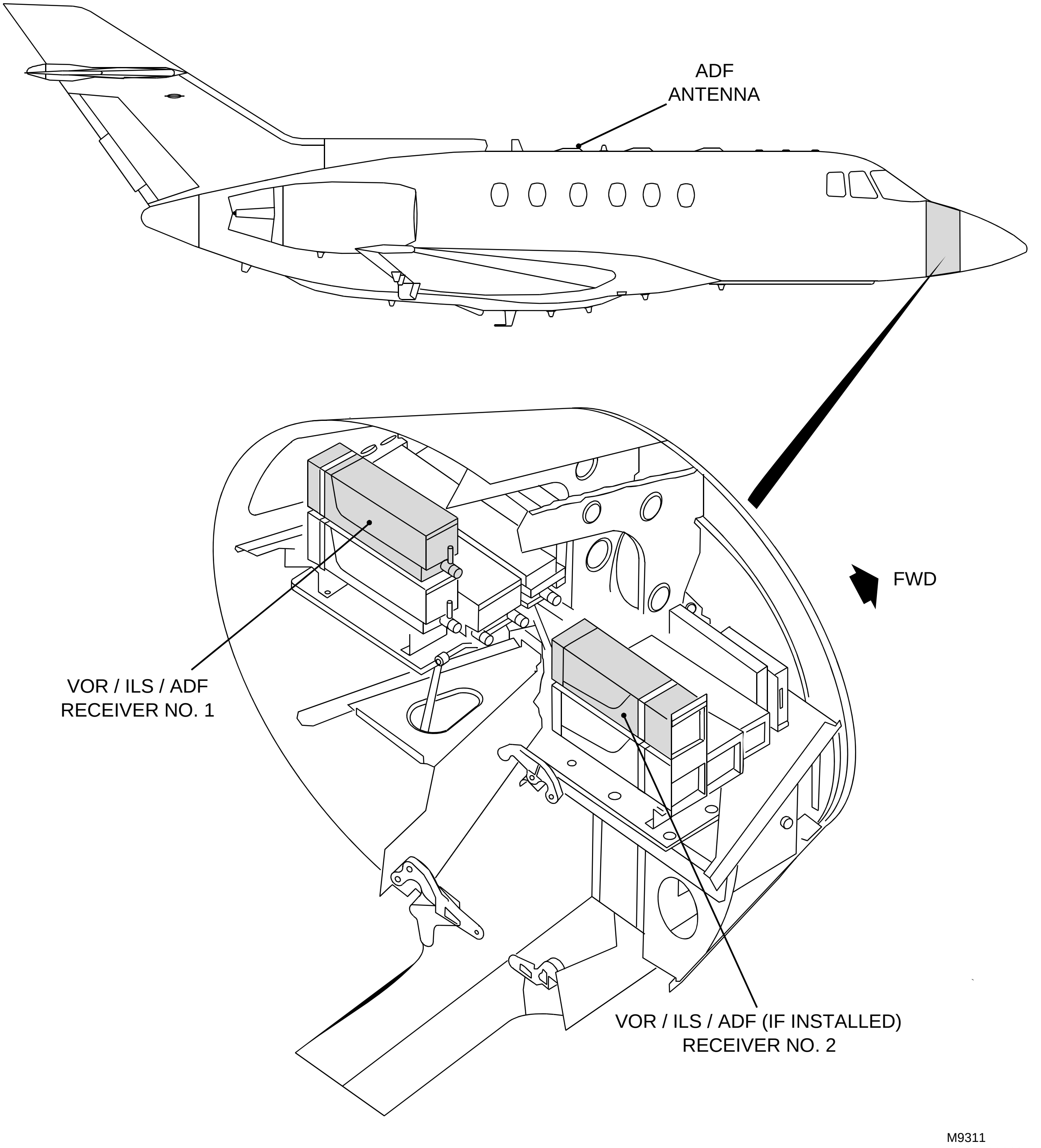
3. OPERATION

This airplane has a single Collins ADF, with the option of a dual installation, which is part of the Collins Radio Sensor System (RSS) that includes all of the communication and navigation radios except the HF.

The No.1 ADF (NAV-4000) receiver is supplied with 28 Vd.c. from PE bus.

The No.2 ADF (NAV-4000) receiver (if installed) is supplied with 28 Vd.c. from PS2 bus.

Two control display units (CDU-6200) are used to tune the ADF.



ADF ANTENNA
FWD
VOR / ILS / ADF RECEIVER NO. 1
VOR / ILS / ADF (IF INSTALLED) RECEIVER NO. 2
M9311
HA00B988091AA

Figure 1
ADF Receivers and Antennas - Locations

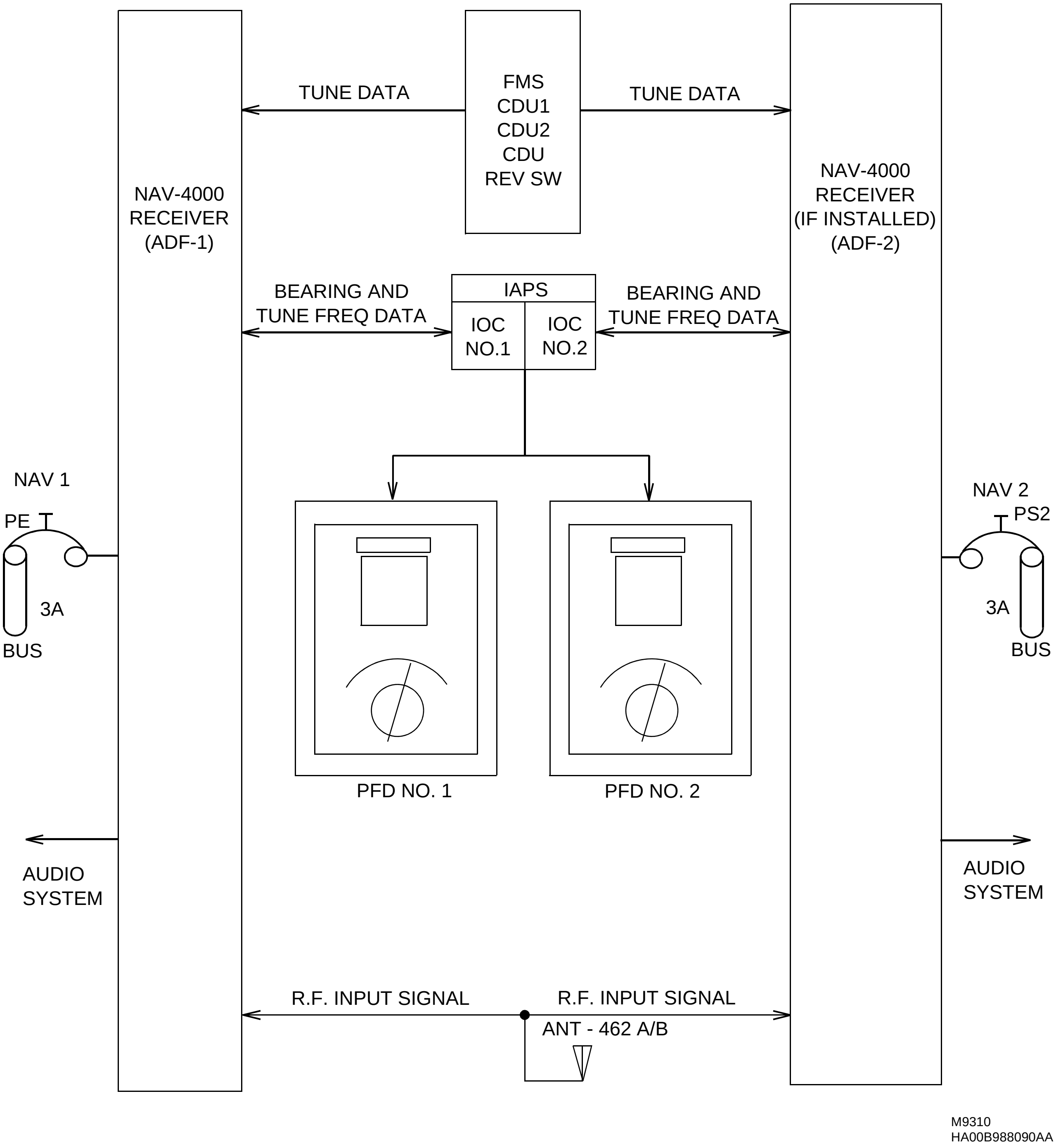
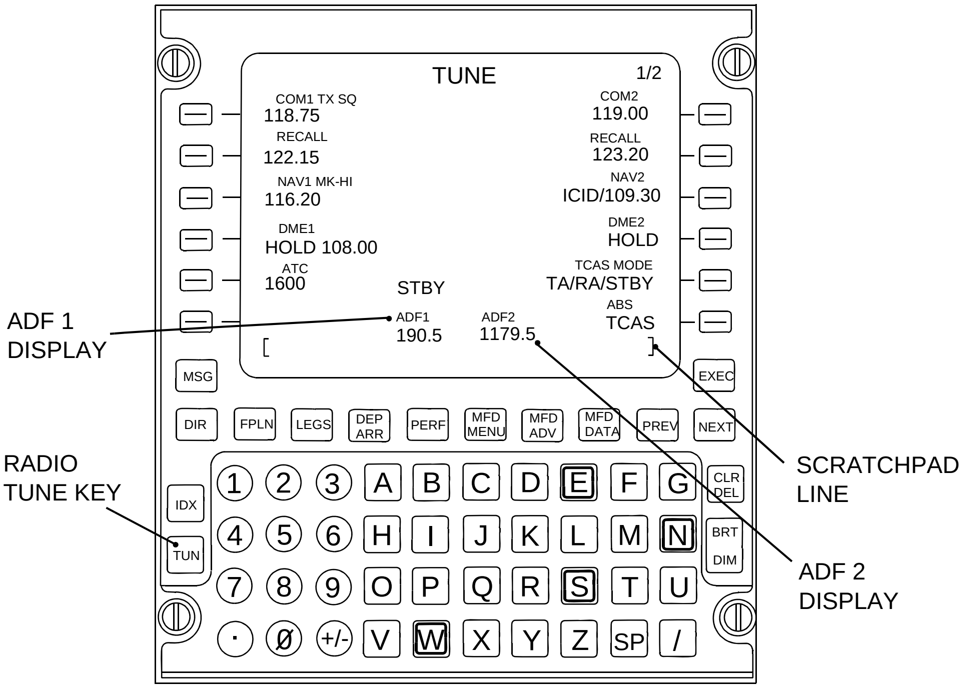
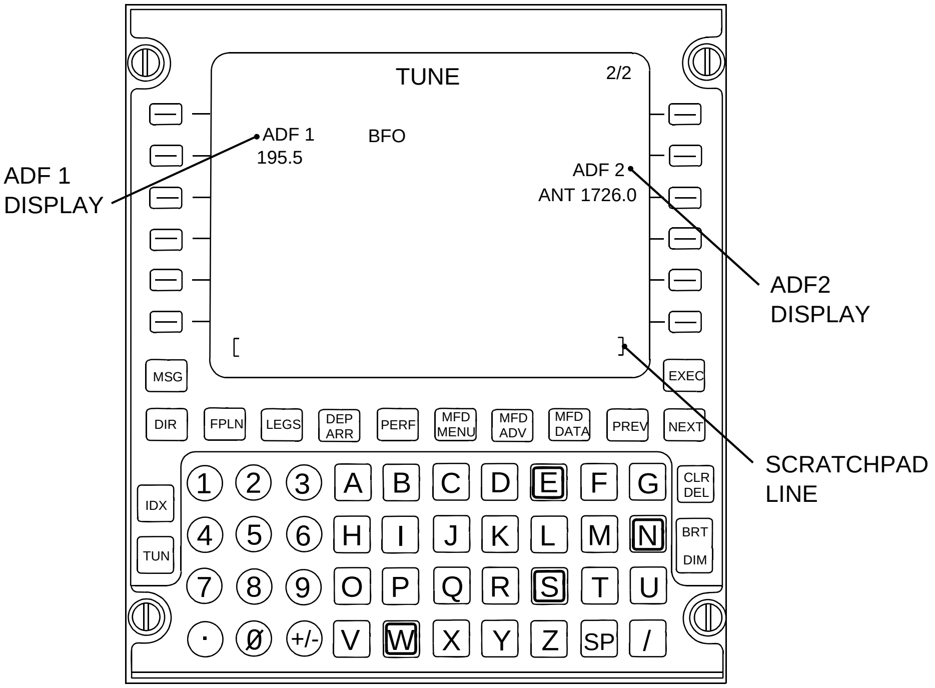


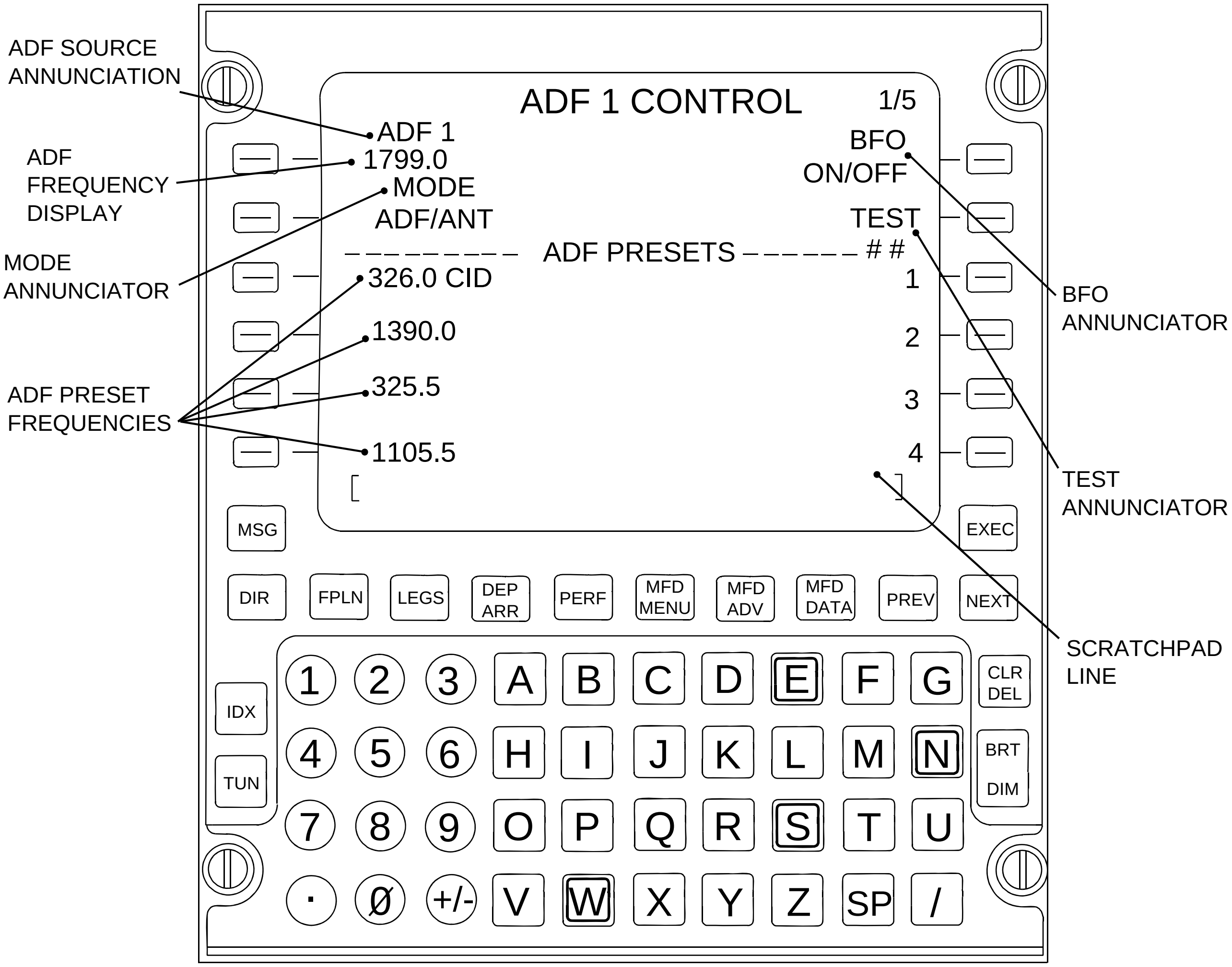
Figure 2
ADF System Overview





M5786
HA00B995422AA

Figure 3
Radio Tune Page



M5785/1
HA00B995406AA

Figure 4
ADF Control Page

To tune the ADF, push the TUN button on either CDU, to access the TUNE page. At the bottom of the TUNE page, enter the desired frequency or preset number onto the scratchpad line, then push the ADF line select key (LSK) to transfer this information to the selected field. If the information is valid, it displays (green) in the data field and the radio immediately retunes. The ADF active frequency shows green for approximately 3 seconds after entry and whenever the CDU command frequency matches the frequency from the radio. If the radio frequency does not match the commanded frequency, the frequency shows amber. Push the ADF LSK again to view the ADF CONTROL page.

If dual ADFs are installed, push the NEXT function key to access TUNE page 2 - then push the ADF LSK to view the ADF CONTROL page (Ref. Table 1) and (Ref. Figure 3 and Figure 4).

NOTE: When TCAS is enabled through configuration strapping and two ADF radios are installed, the active ADF 1 frequency is shown, but not controlled, on the first tune page. All ADF 1 and ADF 2 radio control occurs on the second TUNE page. If only one ADF radio is installed, the ADF radio is shown and controlled on the first TUNE page.

Table 1
ADF CONTROL Screen Annunciators, Controls and Displays

ADF Source Annunciator	...	The ADF source annunciator shows the active radio. The ADF 1 source annunciator means the CDU is controlling a No.1 (left side) radio.
ADF Active Frequency display	...	This display shows the active ADF radio frequency. Enter the desired frequency or preset number onto the scratchpad line - then push the ADF LSK to transfer this frequency to the selected field. If the frequency is valid, it displays in (green) in the data field and the radio immediately retunes.
Mode Line Key and Annunciator	...	Push the mode LSK to alternately select the ADF or ANT (antenna) mode. The annunciator that shows larger and is colored cyan is selected. In the ADF mode, the radio provides bearing-to-the-station and aural outputs. In the ANT mode the radio provides only an aural output.
BFO Line Key and Annunciator	...	Push the BFO (beat frequency oscillator) LSK to alternately select ON or deselect OFF BFO mode operation. The annunciation that is larger and colored cyan is the selection. When BFO is selected the ADF radio generates a 1 000 Hz aural BFO tone when a keyed cw signal is received.
TEST Line Key	...	Push the TEST LSK to start the ADF radio self-test routine. The TEST annunciator becomes larger while the ADF test is on.

Table 1
ADF CONTROL Screen Annunciators, Controls and Displays

ADF PRESETS Display	…	The numbered ADF PRESETS display has up to 20 preset ADF frequencies. Push the NEXT or PREV function key to select the next or previous preset page and the associated LSK to transfer the numbered preset frequency to the NAV active frequency field. To create or modify an ADF PRESETS frequency, enter the desired frequency and/or identifier onto the scratchpad line - then push the associated numbered LSK to transfer this frequency to the numbered preset frequency field. If the frequency is valid, it shows in the data field.

NAVIGATION
DEPENDENT POSITION DETERMINING
AUTOMATIC DIRECTION FINDER (COLLINS NAV-4000)
MAINTENANCE PRACTICES

1. INFORMATION (EFFECTIVITY: AIRPLANE SERIAL NO. 258744 AND AFTER OR AIRPLANES WITH KITS AAC-0409 AND AAC-0410)

2. REMOVAL/INSTALLATION

A. ADF Receiver

(1) Remove and install the NAV-4000 receiver (Ref. 34-32-30, 401).

(2) Remove and install the ADF antenna (Ref. 34-50-15, 401).

3. ADJUSTMENT/TEST

A. Procedure

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the ADF system and antenna.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the ADF system and antenna.

NAVIGATION
DEPENDENT POSITION DETERMINING
AIR TRAFFIC CONTROL SYSTEM
DESCRIPTION AND OPERATION

1. INFORMATION

The ATC system is a solid-state radar beacon system which consists of transponders (TDR-94D), control units (FMS CDU) and L-band antennas. The system lets ATC controllers locate and quickly identify individual airplanes on the ATC ground controllers plan position indicator, within the control area. The system can interrorgate and receive replies up to a line-of-sight range of approximately 200 nautical miles.

2. DESCRIPTION

The ATC system is activated as soon as the electrical power is switched on and the flight management system is operational (Figure 1, Figure 2 and Figure 3). However, while on the ground, the transponders can, due to the AIR/GROUND (WOW/SQUAT) switch, only receive.

Altitude data is supplied to the transponders through the IAPS and CDUs.

When requested by the ground controller to transmit a special identification code, push the IDENT button on the pilot's or co-pilot's glareshield.

The ATC system uses the components that follow:

- TDR-94D Transponder (Qty.2)
- L-Band Antenna (Qty.4)
- Flight management System CDU's (Qty.2)
- ATC IDENT Switches - Pilots and co-pilots glareshield

A. Mode S Enhanced Surveillance Transponder (Effectivity: Airplane Serial No. 258717 and After or Airplanes with SB. 34-3717 and Kit No. 149-3417 embodied)

The installed Mode S system satisfies the data requirements of the International Civil Aviation Organization (ICAO) Doc. 7030/4, Regional Supplementary Procedures for SSR Mode S Enhanced Surveillance in designated European airspace.

The capability to transmit data parameters is designated in the table that follows:

Parameter	Available
Magnetic Heading	Yes
Indicated Airspeed	Yes
Mach Number	Yes
Vertical Rate	Yes
Roll Angle	Yes
Track Angle Rate	* Yes
True Track Angle	Yes
Ground Speed	Yes

Parameter	Available
Selected Altitude	Yes
Barometric Pressure Setting	Yes
* Available only when Inertial Reference System is installed.	

3. OPERATION

The No.1 transponder is supplied with 28 volts DC from PE BUS through circuit breaker ATC 1 rated at 3 amps. This circuit breaker is located on panel DA-A.

The No.2 transponder is supplied with 28 volts DC from PS2 BUS through circuit breaker ATC 2 rated at 3 amps. This circuit breaker is located on panel DA-A.

The transponders operate in mode-S. Mode-S gives identification which adds a data link to give better communications between the air and the ground, and with airborne airplanes within range. In addition, the TDR-94D can receive and send data link messages that are required for ATC automation (Figure 3). The added data link capability lets the transponder do additional air traffic control and airplane separation assurance functions.

With mode-S, each airplane is assigned a unique identification code. This code will let you have automatic and unique interrogation and display of a specific airplane. The airplane identification is assigned at installation and is based on the tail number. Jumper wires, in the airplane, interconnect to select the mode-S identification. The unique identifier is required in TCAS operations.

The transponders use pulse mode discriminating techniques to recognize interrogating signals from a ground station and establishes the return path for the coded replies to valid interrogations. The transponders receive signals on a frequency of 1030 MHz and transmits on a frequency of 1090 MHz. The selected TDR automatically transmits identification, altitude and select information to the Air Traffic Control Radar Beacon System (ATCRBS).

A suppression amplifier, inside the transponder, generates a blanking pulse when the interrogation processor selects the transmit mode. This suppression pulse momentarily inhibits other L-band equipment, on the airplane, to protect then from possible damage by high energy transmissions. These L-band units also generate a blanking pulse output when they prepare to transmit. The pulse temporarily inhibits the TDR and other receivers in the L-band units. In this way, mutual interference between the transponders and other L-band equipment, installed in the airplane, is prevented.

When the airplane lands, the AIR/GROUND (WOW/SQUAT) switch inhibits both transponders, they can receive but they cannot transmit.

TCAS II equipped airplanes have two TDR-94D transponders each linked to two L-band antennas.
The simultaneous operation of the antennas makes sure the airframe cannot block the mode-S communication.

Either CDU can be used to tune the selected ATC transponder.

There is a CDU reversion switch mounted on the bottom of the left and right instrument panels. When the switch is in the CDU position each CDU controls its own on-side system. If the switch is pushed to the REV position the cross-side CDU is switched OFF and the on-side CDU will control both the No.1 and No.2 systems.

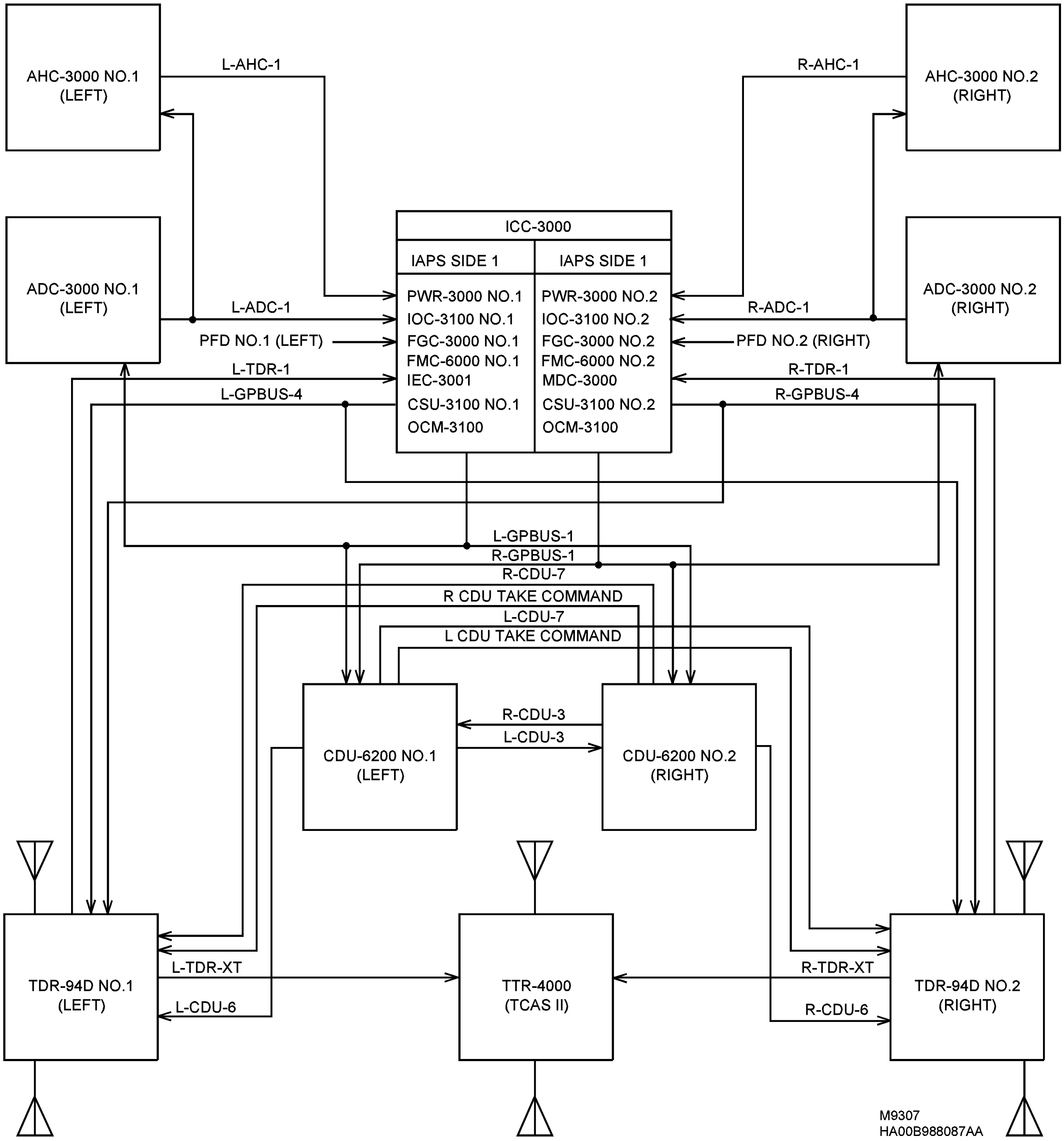


Figure 1
ATC System Overview

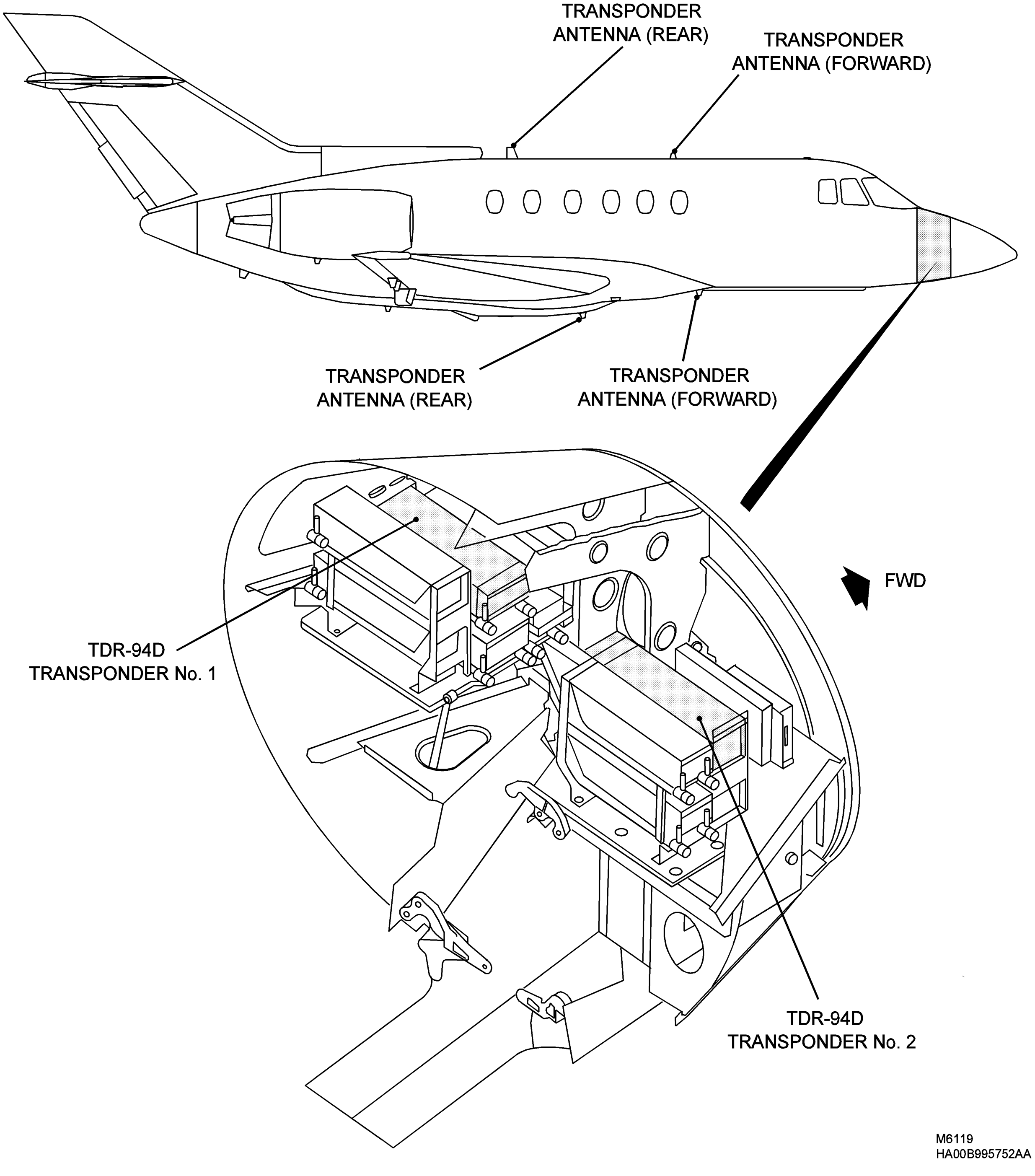
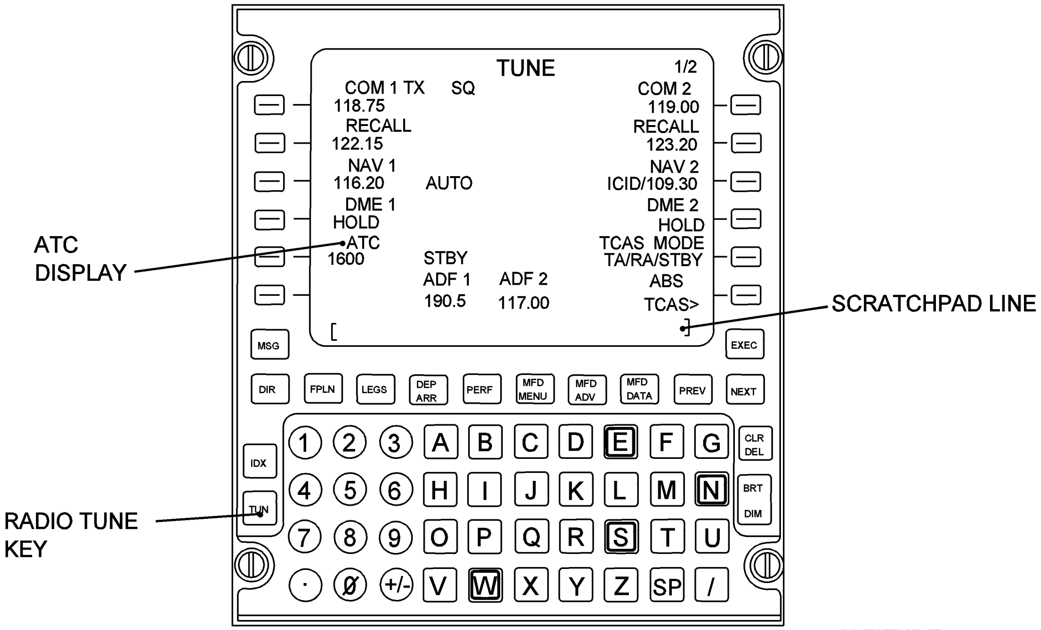
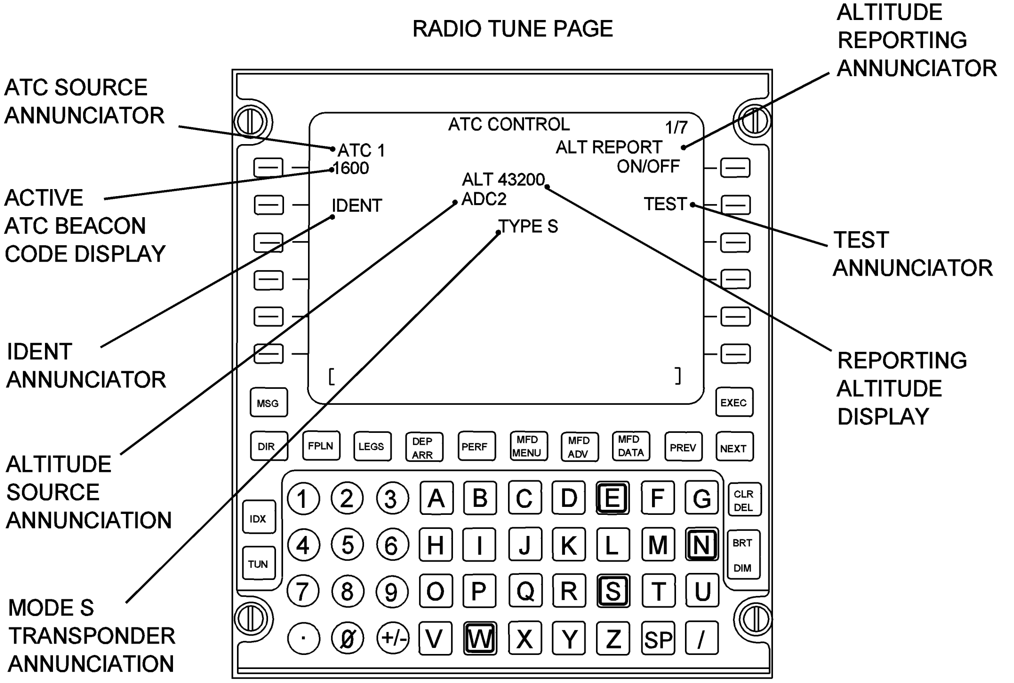

TRANSPONDER ANTENNA (REAR)
TRANSPONDER ANTENNA (FORWARD)
TRANSPONDER ANTENNA (REAR)
TRANSPONDER ANTENNA (FORWARD)
FWD
TDR-94D TRANSPONDER No. 1
TDR-94D TRANSPONDER No. 2
M6119
HA00B995752AA

Figure 2
ATC Equipment Locations



RADIO TUNE PAGE



ATC CONTROL PAGE

M6120
HA00B995753AA

Figure 3
CDU Control Pages

A. Transponder Tuning

NOTE: There are certain codes reserved for emergency use only. These codes are 7777, 7700, 7600 and 7500.

On the left or right CDU, push the TUN function key	...	The TUNE page appears.
On the left or right CDU, enter the active transponder code on the scratchpad line and then push the ATC line select key [L5] LSK	...	The active code is transferred from the scratchpad line to below the ATC annunciation. If the information is valid, it shows green in the data field and the radio immediately retunes.
When a transponder has been selected (ATC 1 or ATC 2) the STBY annunciation, under the ALT annunciation, will be replaced by a REPLY annunciation when the active transponder replies to an interrogation.		
To the right of the annunciation there is a TCAS MODE presentation. To gain immediate access to the ATC CONTROL page, from the TUNE page, push the ATC [L5] LSK twice after you make sure the scratchpad line is empty. The ATC CONTROL screen annunciators, controls and displays are:		
ATC Source Annunciator	...	The ATC source annunciation shows which transponder the CDU controls. Only one transponder is active at any time.
ATC Active Beacon Code Display	...	This display shows the selected transponder reply code. An ATC beacon code can be entered on the scratchpad line, push the [L1] LSK to transfer the code to this field. If the beacon code is valid, it shows in the data field and the radio immediately retunes. STBY and REPLY can annunciate to the right of the active beacon code. STBY annunciates when the standby mode is selected. REPLY annunciates, colored cyan when the transponder replies to an interrogation.
IDENT Line Select Key and Annunciator	...	Push the IDENT [L2] LSK to transmit the beacon code. The IDENT annunciator enlarges, and is colored cyan, while active (approximately 18 seconds).
Altitude Source annunciation	...	The altitude data source (ADC1 or ADC2) annunciates, colored cyan, below the reporting altitude display.
Mode-S Transponder annunciation	...	TYPE S, colored cyan, annunciates on the display.

Altitude Reporting Line Select Key and Annunciator	…	Push the ALT [R1] LSK to alternately turn the altitude reporting function ON or OFF. The larger, cyan colored, annunciation shows the current selection. Altitude reporting ON is the normal operating mode. Altitude reporting OFF (reply mode) is normally used only when requested by ATC. The transponder replies to interrogation pulses but does not transmit altitude data. The transponder automatically replies to (mode-S) ATCRBS. No operator action is required.
Reporting Altitude Display	…	This display shows the uncorrected barometric altitude (colored white) that is transmitted in the altitude reporting mode.
TEST Line Select Key and Annunciator	…	Push the TEST [R2] LSK to start the TDR self-test routines. The TEST annunciator enlarges, and is cyan in color, while the TDR test is active - approximately 10 seconds.
XPDR FAIL annunciation	…	If the selected transponder fails, a XPDR FAIL annunciation, in yellow, shows to the right of the ATC legend.

AIR TRAFFIC CONTROL SYSTEM - REMOVAL/INSTALLATION

1. Air Traffic Control System

A. Preliminary Procedures

(1) Open and safety tag the relevant circuit breakers, listed below (Chapter 24,ELECTRICAL POWER).

Panel	Label
DA-A	ATC 1
DA-A	ATC 2

B. TDR-94D Transponder removal

(1) Open the nose gear bay doors (Chapter 32, NOSE GEAR DOORS - SERVICING).

CAUTION: DO NOT LIFT THE TRANSPONDER UP, OR MOVE FROM SIDE TO SIDE UNTIL THE REAR CONNECTORS ARE COMPLETELY DISENGAGED. THIS IS TO PREVENT DAMAGE TO THE CONNECTOR PINS.

(2) Remove the locking wire and slacken the securing clamps; slide the unit straight out from the mount.

(3) Install protective caps or covers to the electrical connectors.

C. TDR-94D Transponder installation

(1) Remove the protective caps or covers from the electrical connectors.

(2) Carefully slide the unit squarely into the mount until the rear connectors are correctly mated. Engage and tighten the securing clamps and wirelock.

(3) Close the nose gear bay doors (Chapter 32, NOSE GEAR BAY DOORS - SERVICING).

(4) Remove the safety tag and close the circuit breakers opened in paragraph 1.A. (Chapter 24, ELECTRICAL POWER).

(5) Do a test of the ATC system (ADJUSTMENT/TEST).

D. L Band antenna removal

(1) Do the preliminary procedure paragraph 1.A.

(2) Get access to the appropriate antenna.

(3) Remove the screws which attach the antenna to the mounting plate.

(4) Carefully raise the antenna clear of the mounting plate to get access to the co-axial connector.

(5) Disconnect the co-axial cable connector from the antenna.

(6) Remove the antenna.

(7) Carefully remove and do a check of the gasket. Discard the gasket if it is damaged.

(8) Install protective caps and covers to the antenna connections.

E. L Band antenna installation

Equipment/Materials	Part/Item No.
Gasket kit	10-500-11-2K
Polysulphide Polymer	313 (Chapter 20-95-301)
Cleaner/solvent (MPK)	201 (Chapter 20-95-201)
Aluminum wool	Local supply

(1) Make sure the bonding areas of the attachment screws, antenna and mounting plate mating surfaces are have no deterioration, deposits or contamination.

(2) Clean the mating surfaces of the antenna and the mounting plate with cleaner/solvent (Item 201) and aluminum wool.

(3) Remove the cap and cover from the connectors and attach the co-axial cable to the antenna.

(4) Put the gasket (new if necessary) in position on the mounting plate.

(5) Put the antenna in position on the gasket and mounting plate and attach with the screws. Seal the periphery of the antenna and the heads of the screws with Polysulphide Polymer (Item 313) (Chapter 20, SEALING OF PRESSURE CABINS).

(6) Remove the safety tags and close the circuit breakers listed in paragraph 1.A. (Chapter 24, ELECTRICAL POWER).

(7) Do a test of the ATC system (ADJUSTMENT/TEST).

F. Close up

(1) Make sure the work area is clean, clear of tools and any miscellaneous items of equipment.

NAVIGATION
DEPENDENT POSITION DETERMINING
AIR TRAFFIC CONTROL SYSTEM
ADJUSTMENT/TEST

1. ATC SYSTEM

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the ATC system and antenna.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the ATC system and antenna.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (COLLINS TCAS II) - DESCRIPTION AND OPERATION

1. Description *(Figure 1, Figure 2)*

A. General

The TCAS II system is an airborne traffic alert and collision avoidance system that interrogates the ATC (Air Traffic Control) transponders in nearby airplanes, and uses computer processing to identify and show potential and predicted collision threats. The system protects a volume of airspace around TCAS equipped airplanes. Appropriate aural and visual advisories are given to provide sufficient separation when the computer analysis of transponder replies from intruding airplanes predicts a penetration of the protected airspace.

The TCAS system has the units that follow:

- One TTR-4000 TCAS Transmitter Receiver.
- Two TRE-920 TCAS Directional Antennas (one top and one bottom).
- Two TDR-94D ATC/Mode S Transponders and associated top and bottom antennas.

The units that follow are part of the Electronic Flight Instrument System (EFIS), but have TCAS functions:

- Two Primary Flight Displays (PFDs).
- Two Multifunction Displays (MFDs).
- The Control Display Units (CDUs) control the TCAS.

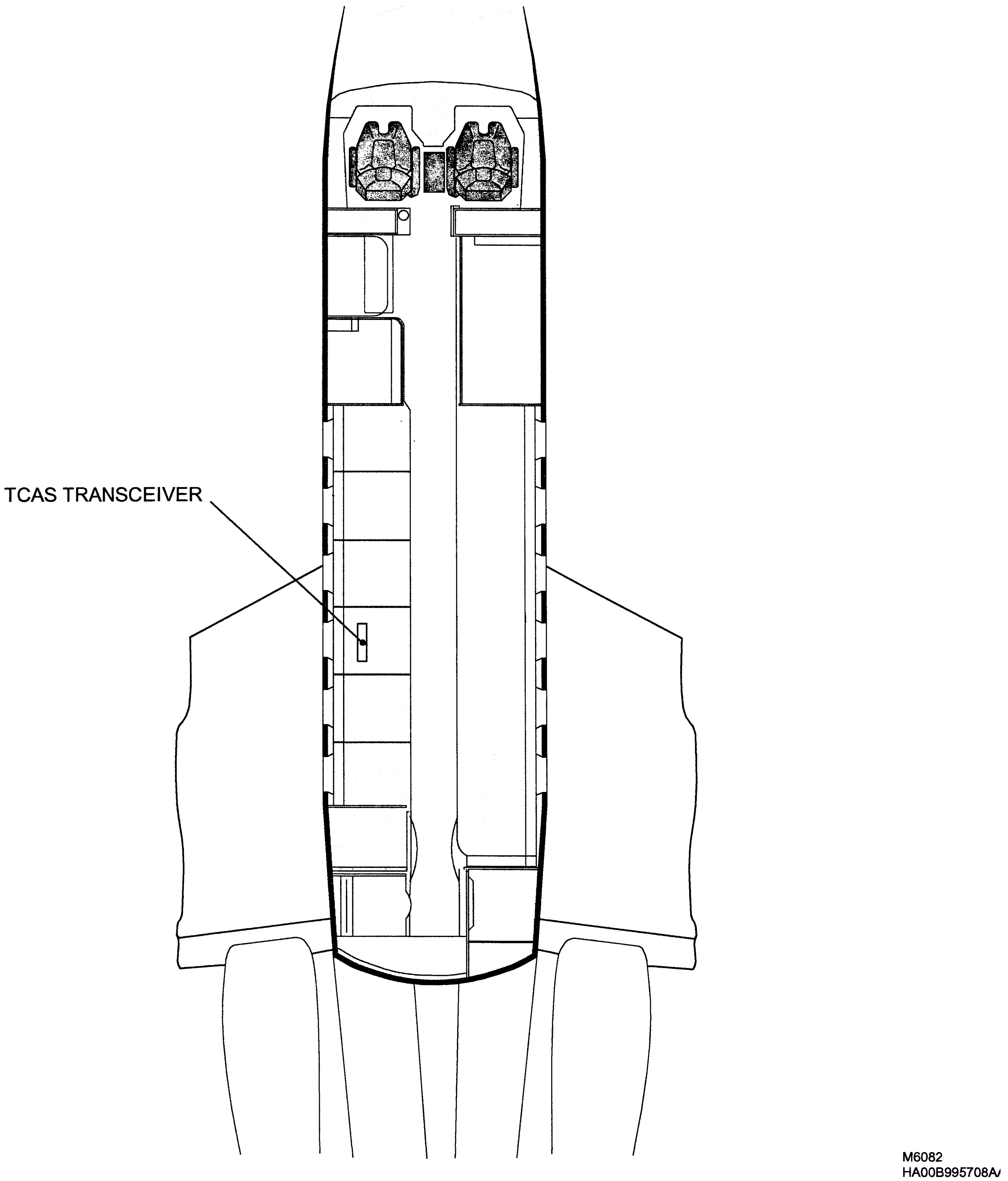
The TCAS Traffic Display (TD) data can be shown on the MFD and overlaid on most of the navigation displays. When the MFD has been deselected by PFD/MFD reversion, the TCAS TD can be overlaid on most of the PFD navigation displays. The Resolution Advisory (RA) data is always shown on the PFD.

B. Traffic Transmitter/Receiver (TTR-4000)

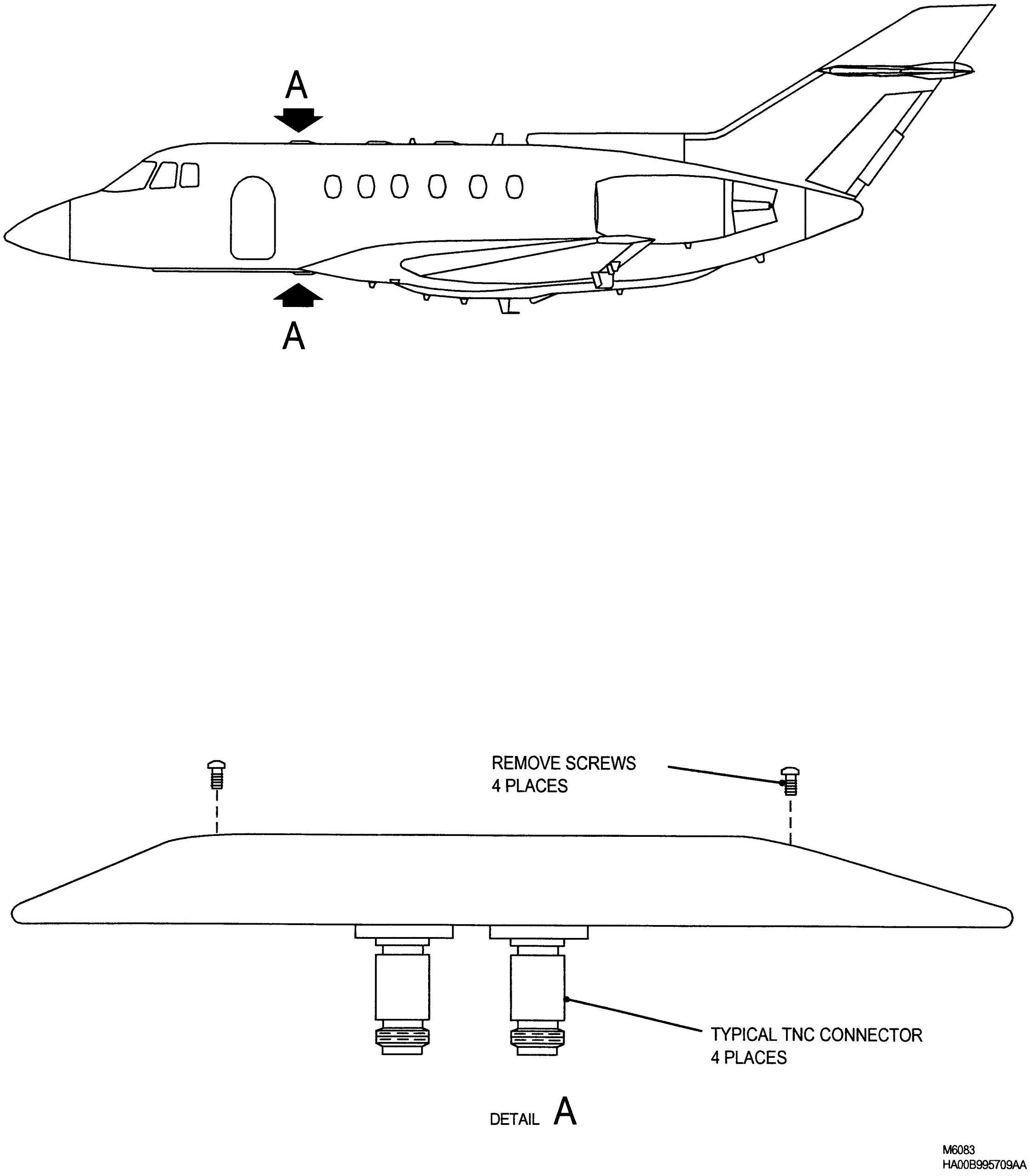
The TTR-4000 TCAS II traffic transmitter/receiver operates with the TDR-94D transponders to interrogate transponders in nearby airplanes.

The TTR transmits mode-C and mode-S transponder interrogation signals and monitors all replies. Internal processing determines the range, bearing and altitude of each nearby airplane which replies. This allows the TTR to find all transponder equipped airplanes within range. If an airplane is on a conflicting path, the TTR generates traffic advisory (intruder alert), resolution advisory (recommended vertical escape maneuver), and/or synthesized voice audio outputs. If the intruder airplane has a mode-S transponder, the TTR uses the TDR-94D transponder to transmit collision avoidance data to that airplane. This mode-S link lets two TCAS systems coordinate conflict resolution maneuvers between airplanes.

The top and bottom TRE-920 directional antennas function with the TTR-4000.



TRE-920 TCAS Transceiver location
Figure 1



TRE-920 TCAS antenna (typical installation)
Figure 2

The TTR uses a speech processor and a digital-to-analog converter to generate synthesized voice audio outputs. This TCAS audio supplies dedicated voice messages to give traffic alerts or vertical maneuver advice.

C. TRE-920 Directional Antenna

The TTR receives Air Traffic Control Radar Beacon System (ATCRBS) and mode-S transponder replies from the TRE top antenna (No.1) and/or the TRE bottom antenna (No.2). The top and bottom antennas are installed so that an intruder airplane is not shadowed from the TCAS by the airframe.

The antennas are directional, which lets the system compute a bearing to a target airplane. The TRE contains four passive antenna elements installed at the cardinal (90 degree) points inside the assembly. Each element is independent of the others and is connected to the TTR-4000 through a separate coaxial cable. When the airplane landing gear is set down, the lower antenna operates as an omni-antenna, as it is partially shielded by the landing gear.

The upper and lower directional antennas are installed forward of the ATC antennas.

2. Operation

A. General

There is a CDU reversion switch mounted on the bottom of the left and right instrument panels. When the switch is in the CDU position either CDU can control the system. If the switch is pushed to the REV position the cross-side CDU is switched OFF and the system can only be from the on-side CDU.

B. Power supplies

The TCAS (TTR-4000) is supplied with 28 Volts DC from the PS1 busbar.

C. TCAS Displays - CDU *(Figure 3, Figure 4)*

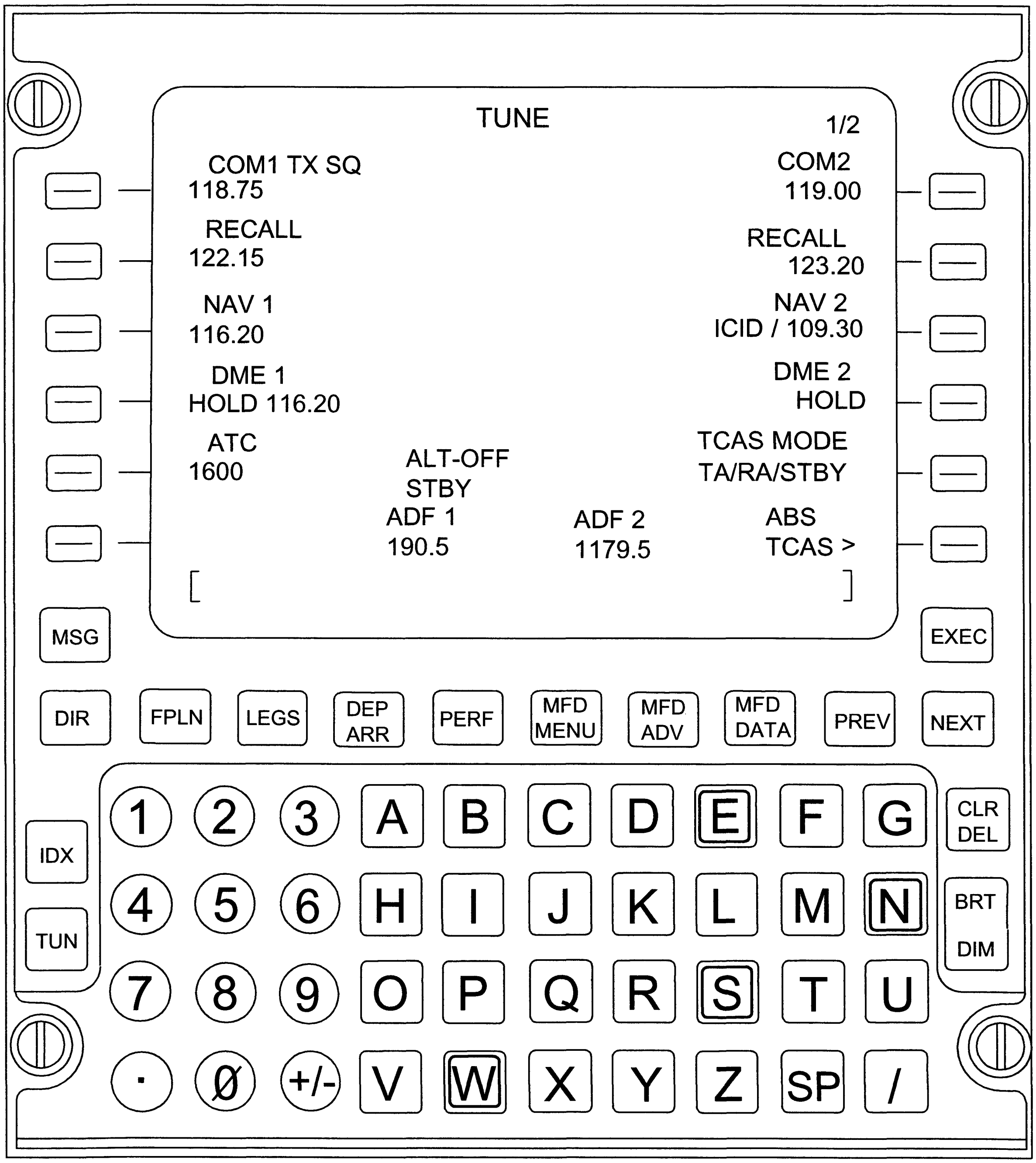
NOTE: There are twelve Line Select Keys (LSK) on each CDU - six at the top left and six at the top right. Throughout this procedure, the numbering of these LSKs is specified as:
Keys on the left side of the CDU are referred to as [L1] LSK (top) thru [L6] LSK (bottom).
Keys on the right side of the CDU are referred to as [R1] LSK (top) thru [R6] LSK (bottom).

(1) The display operation for the TUNE page on the CDU is as follows *(Figure 4):*

TCAS MODE	...	Push the TCAS MODE [R5] LSK successively to cycle through the TA (traffic advisory only), TA/RA (traffic and resolution advisories) and STBY (standby) mode selections. The larger annunciation, in cyan text, shows the active status.
TCAS	...	Push the TCAS [R6] LSK to access the TCAS CONTROL page.

(2) The display operation for the TCAS CONTROL page is as follows *(Figure 4):*

MODE	...	Push the MODE [L1] LSK successively to cycle through the TA, TA/RA and STBY mode selections. The larger annunciation, in cyan text, shows the active status.



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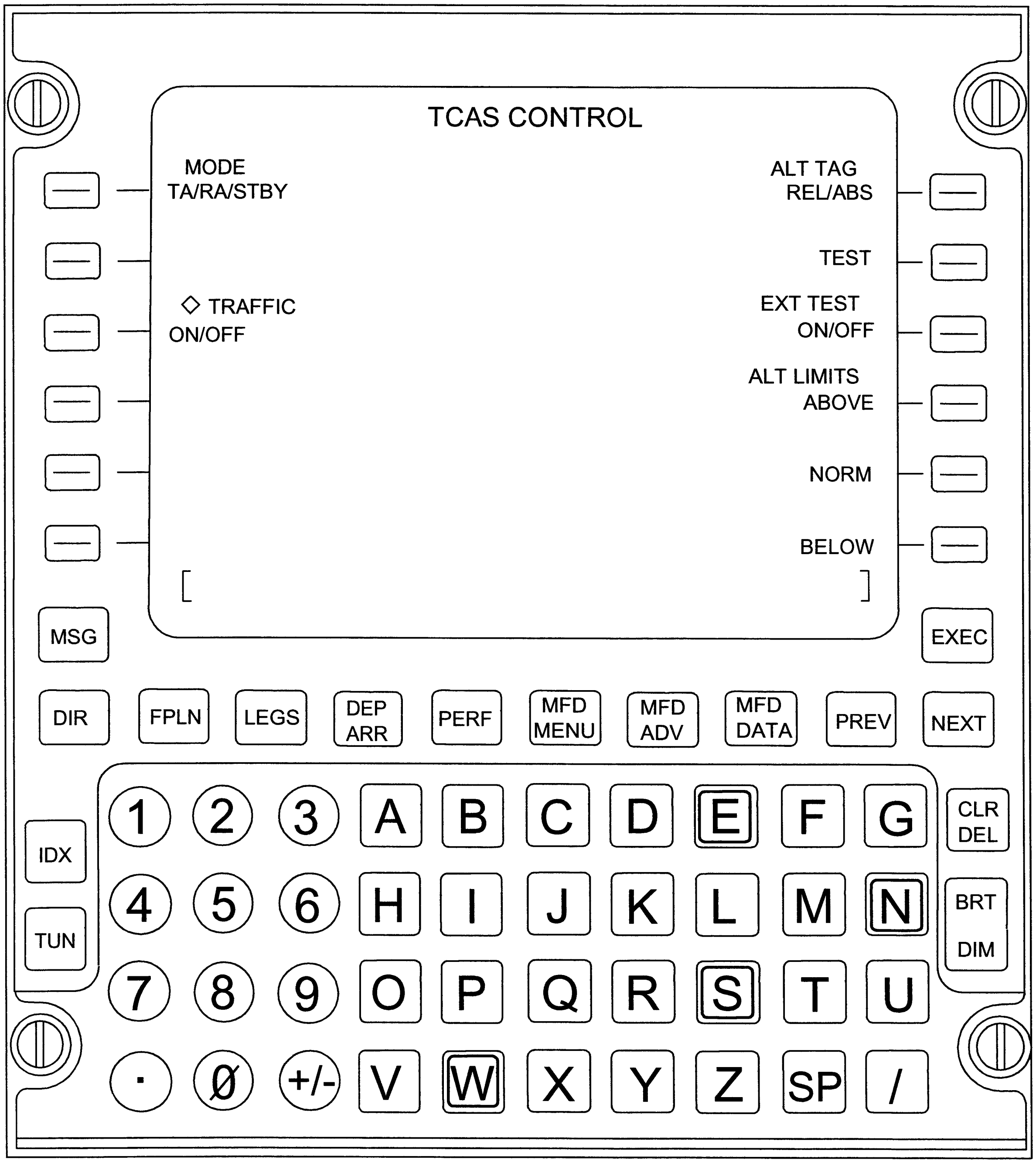
CDU TUNE Pages
Figure 3



M5412
HA00B995277AA

TCAS CONTROL Page
Figure 4

TRAFFIC ... Push the TRAFFIC [L3] LSK to make the TCAS traffic selection. The possible traffic selections are ON (all traffic shown) or OFF (threat traffic only shown). The larger annunciation, in cyan text, shows the active status. A diamond symbol to the left of the TRAFFIC legend shows the type of traffic this selection affects.

ALT TAG ... Push the ALT TAG [R1] LSK to make the altitude tag selection. The possible altitude tag selections are REL (relative) or ABS (absolute). The larger annunciation, in cyan text, shows the active status. Relative altitude is the difference between the intruder airplane altitude and (your) own airplane altitude. Absolute altitude is the Mean Sea Level (MSL) altitude of the intruder airplane.
The selected altitude tag (REL or ABS) also shows, colored cyan, on the TUNE page above the TCAS legend.

TEST ... Push the TEST [R2] LSK to make the TCAS TEST selection. The TCAS test period defaults to approximately 2 seconds after the push and release of the LSK. The TEST annunciation will be shown as active (the text becomes larger, and cyan in color) for approximately 10 seconds. The transponder test is also activated for its default period duration.

EXT TEST ... Push the EXT TEST [R3] LSK to make the Extended TCAS TEST selection. The possible Extended TEST selections are ON or OFF. The larger annunciation, in cyan text, shows the selected mode. Extended TEST may stay selected as long as the TCAS CONTROL page is selected. If the TUNE page is selected while extended TEST is active, OFF will automatically be selected. Extended TEST is only available when the airplane is on the ground.

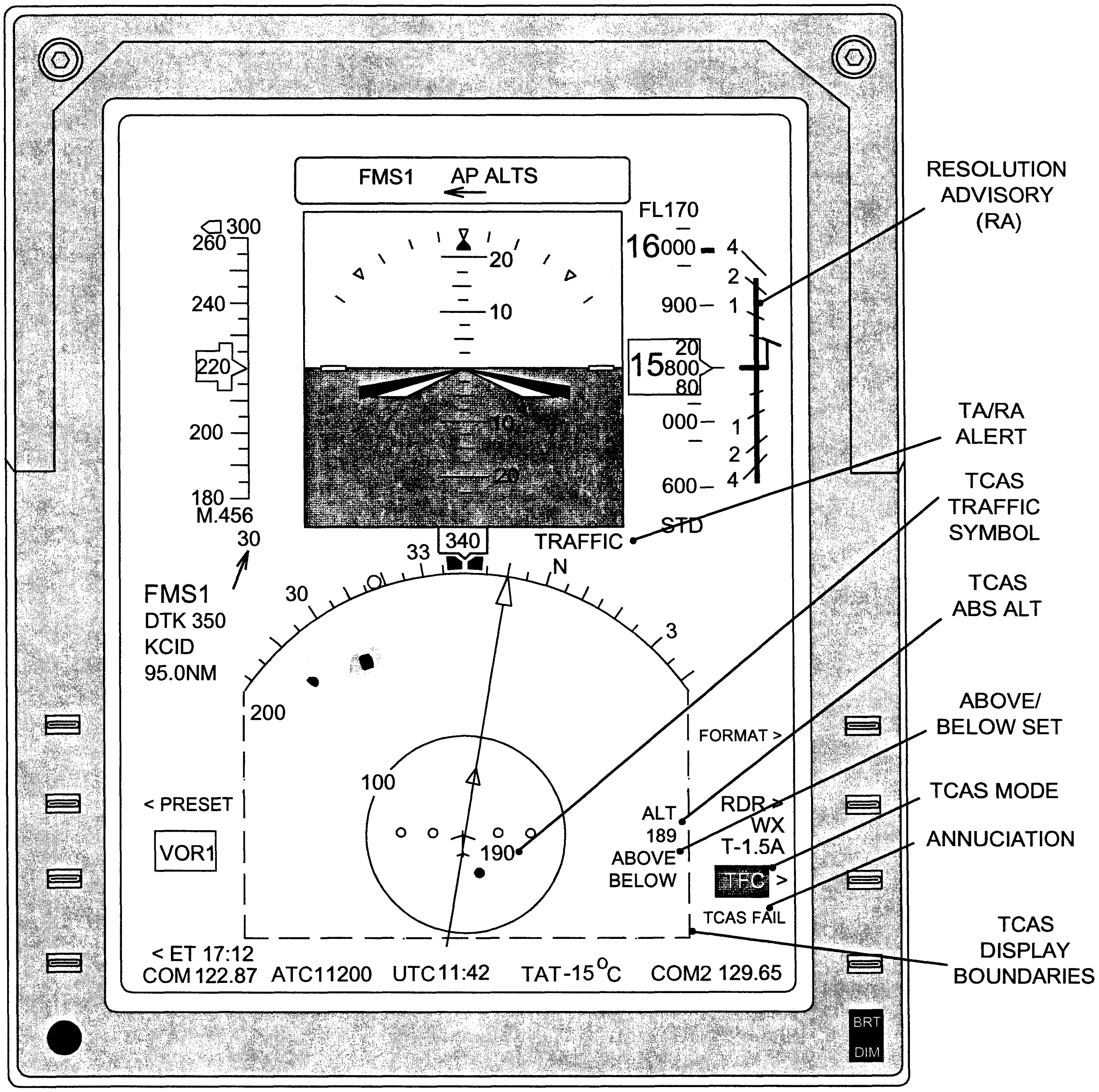
ALT LIMITS ... Push the [R4] LSK, [R5] LSK or [R6] LSK to select the Altitude Limits of the TCAS protection window. Push the ABOVE [R4] LSK to select the ABOVE altitude limit. Push the NORM [R5] LSK to select the NORM altitude limit. Push the BELOW [R6] LSK to select the BELOW altitude limit. When both ABOVE and BELOW are selected, the unrestricted altitude mode is enabled. When NORM is selected, ABOVE and BELOW are deselected. The larger annunciation(s), in cyan text, show the selection(s).
The protection window defines a zone of vertical air space relative to the airplane. Intruders into this zone are tracked and are considered potential threats:
When NORM is selected, the protection window is 2,700 feet above and 2,700 feet below the airplane.
When ABOVE only is selected, the protection window is 9,900 feet above and 2,700 feet below the airplane.
When BELOW only is selected, the protection window is 2,700 feet above and 9,900 feet below the airplane.
When the ABOVE and BELOW are both selected (unrestricted altitude mode), the protection window is 9,900 feet above and 9,900 feet below the airplane.

D. PFD TCAS Mode and Annunciations *(Figure 5)*

NOTE: There are eight LSKs on the PFD - four at the bottom left and four at the bottom right of each display. Throughout this procedure, the numbering of these LSKs is specified as:
Keys on the left side of the PFD are referred to as [L1] LSK (top) thru [L4] LSK (bottom).
Keys on the right side of the PFD are referred to as [R1] LSK (top) thru [R4] LSK (bottom).

The TCAS annunciations that show on the PFD are as follows:

TCAS Mode	...	The TFC (TCAS Traffic) legend is shown at [R3] LSK. The TCAS mode is shown below the TFC legend. Only one TCAS mode annunciation can be shown at a time, and they are shown in the priority listed below:
- TCAS TEST	...	This annunciation is shown in cyan whenever TCAS is set to test mode and Traffic Display (TD) is actively selected for display, and is white if TD is not actively selected for display.
- TCAS OFF	...	This annunciation is shown in cyan whenever the TCAS system is set to STBY mode and TD is actively selected for display, and is white if TD is not actively selected for display.
- TA ONLY	...	This annunciation is shown in cyan when TA (Traffic Advisory Only) mode is selected on the CDU (refer to B), and TD is actively selected for display, and is white if TD is not actively selected for display. This annunciation turns amber and flashes when a TA is present, regardless of the TD display state. RAs (Resolution Advisories) are not shown when TA Only is the active mode.
TRAFFIC	...	This annunciation is shown above and to the left of the Barometric Altitude display, when the TCAS unit sends out an RA or TA. The annunciation is red for an RA and amber for a TA. The annunciation flashes for 5 seconds when it is first shown. It also flashes for 5 seconds if a TA is upgraded to an RA.
TCAS FAIL	...	This annunciation is shown in amber, in the same position as the TRAFFIC annunciation, whenever TCAS RA, TCAS TD, or other RA or TD related data is not correctly received by the PFD. A TCAS that is turned off is considered failed.
Vertical Resolution Advisories (RAs)	...	If the TCAS finds an RA intruder, and computes collision avoidance data, the RA commanded vertical speed is shown on the Vertical Speed (VS) scale. The advisories are red/green bars which show the forbidden/ acceptable commanded VS ranges and limits. The red/green bars are between the VS Numbers and the VS Pointer in the top right of the display. A red bar shows a warning VS range. If the airplane vertical speed (designated by the VS Pointer) is not along the red bar, a preventative (avoidance) RA exists. Continue the present vertical speed and heading to keep the pointer away from the red bar. If the airplane vertical speed is within the range defined by the red bar, a corrective RA exists. Immediately fly the airplane to the vertical speed shown by the green bar. A green bar shows a safe vertical speed range. This bar, along with a corrective RA, shows the recommended vertical speed range that will resolve the conflict. Immediately fly the airplane to this vertical speed. The VS Pointer, its trailing tail (thermometer), and the VS digital readout (when in view) become red if the current Vertical Speed is in a red (forbidden) TCAS zone.



PFD Mode Annunciation (TCAS)
Figure 5

E. PFD Traffic Displays

When the MFD has been deselected by PFD/MFD reversion, TCAS traffic displays can be overlaid on the PFD ROSE, ARC and MAP formats.

(1) Controls.

(a) Turn the RANGE rotary switch on the Display Control Panel to select the range.

(b) When the TFC [R3] LSK is active, a side-facing cyan caret (>) is shown, which points from the TFC legend to the LSK.

(c) Momentarily push the TFC [R3] LSK on the PFD to overlay the TCAS on the PFD's current display. If you momentarily push the LSK again it will remove the TCAS overlay. When TFC is actively selected for display, the TFC legend is larger and cyan. When TFC is deselected from the display the TFC legend is smaller and white. If TFC is selected for display, but an incompatible format is then selected, the TFC legend remains larger, but turns white. The TFC legend returns to cyan when a compatible format is selected again.

ROSE Mode	...	When TCAS is overlaid on the ROSE format, a TCAS Half Range ring is shown. This is the ROSE/TCAS Mode. The circle made by the outer edge of the heading tick marks is the Full Range ring. There is normal range control in the ROSE/TCAS mode, but the maximum ROSE/TCAS full range is: 40 NM if Air Transport display ranges are selected. 50 NM if General Aviation display ranges are selected.
ARC Mode	...	When TCAS is overlaid on the ARC format, the ARC range rings become the TCAS range rings. The TCAS Half Range hash marks are added to the ARC's Half Range arc.
MAP Mode	...	When TCAS is overlaid on the MAP format, the MAP range rings become the TCAS range rings. The TCAS Half Range hash marks are added to the MAP's Half Range arc.

(d) With TCAS overlay selected, push the FORMAT [R1] LSK to let other PFD formats be shown with TCAS overlay until the TFC [R3] LSK is pushed to deselect the TCAS overlay.

(e) If you continuously push the TFC [R3] LSK for more than 1 second, it will always select the ROSE/TCAS format with the 10 mile Full Range (5 mile Half Range) ring shown. Radar or optional terrain data, if previously shown, will be deselected from display. Radar and optional terrain can not be selected in ROSE/TCAS mode.

(2) Annunciations

(a) TCAS traffic symbols are shown with the relative or absolute altitude, as selected on the CDU, and with a datatag (altitude, climb/descend arrow) when appropriate.

i RA symbols are solid red squares. TA symbols are solid amber circles. Proximate (PROX) traffic symbols are filled cyan diamonds. OTHER traffic (no threat) symbols are open cyan diamonds. TAs and RAs with an intruder range greater than the display area will be shown at the edge of the display area, partially out of view. OTHER (no threat) or PROX traffic with intruder ranges outside the display area are not shown.

ii On the MAP and ARC formats, intruders are shown within the section established by the area that is under the full range arc, which extends down from each end of the arc to the bottom PFD line of text (the COMM/ATC/UTC/TAT line).

(b) The TCAS datatag gives the relative or absolute altitude of the intruder in a format that matches the TCAS altitude annunciation, and has an arrow that shows if the intruder is in a climb or descent. If the intruder is in neither a climb nor descent, no arrow is shown. The datatag value represents the relative or absolute intruder altitude in hundreds of feet, and is the same color as its related TCAS intruder symbol.

(c) The TCAS altitude annunciation shows the PFD's current altitude in hundreds of feet to help orient the pilot to the TCAS altitudes shown with intruders. TCAS altitude is shown in white, directly above the location reserved for the ABOVE/BELOW annunciation on the PFD.

(d) The TCAS Half Range ring is a grey circle with fixed hash marks that cross the circle at the 12 cardinal clock positions.

(e) The TCAS 3 NM Range ring is made by grey tick marks at the 12 cardinal clock positions. The circle which bisects each line is the 3 NM Range ring.

(f) When the TCAS traffic selection is set to OFF on the CDU (TRAFFIC is set to OFF), the cyan TCAS OTHER Traffic (non-threat traffic) symbol is shown below the ABOVE/BELOW status annunciation location. The haloed cyan legend is followed by a haloed cyan dash and haloed cyan OFF.

(g) RA/TA No Bearing displays are shown to the lower right of the selected PFD format. The first two TA or RA intruders without valid bearing data are shown. One line is shown for each intruder. The color of all of the row is amber for TA, and red for RA.

(h) The ABOVE/BELOW status annunciation is shown in haloed white characters, on the right side of the selected PFD format. When selected on the CDU, the altitude "window", which monitors OTHER Traffic, is expanded ABOVE, or BELOW, or both.

F. MFD TCAS Mode and Annunciations

(1) The controls on the TCAS MFD display are the same as on the TCAS PFD display (refer to C.).

(2) The annunciations on the TCAS MFD display are the same as on the TCAS PFD display (refer to C.), except for those that follow:

(a) TCAS FAIL annunciation will not occur for failures that are related exclusively to RA displays.

(b) The MFD does not show a discrete TRAFFIC annunciation in addition to the normal TD display for RAs or TAs.

(c) The MFD has no Vertical Resolution Advisories.

G. MFD Traffic Displays *(Figure 6, Figure 7)*

TCAS traffic displays can be overlaid on the MFD ROSE, ARC and MAP formats. TCAS traffic display is incompatible with MFD PLAN MAP, MAINTENANCE, and FMS TEXT ONLY formats, and these formats are replaced by TCAS ONLY format when TFC is selected.

(1) Controls.

(a) Turn the RANGE rotary switch on the Display Control Panel to select the range.

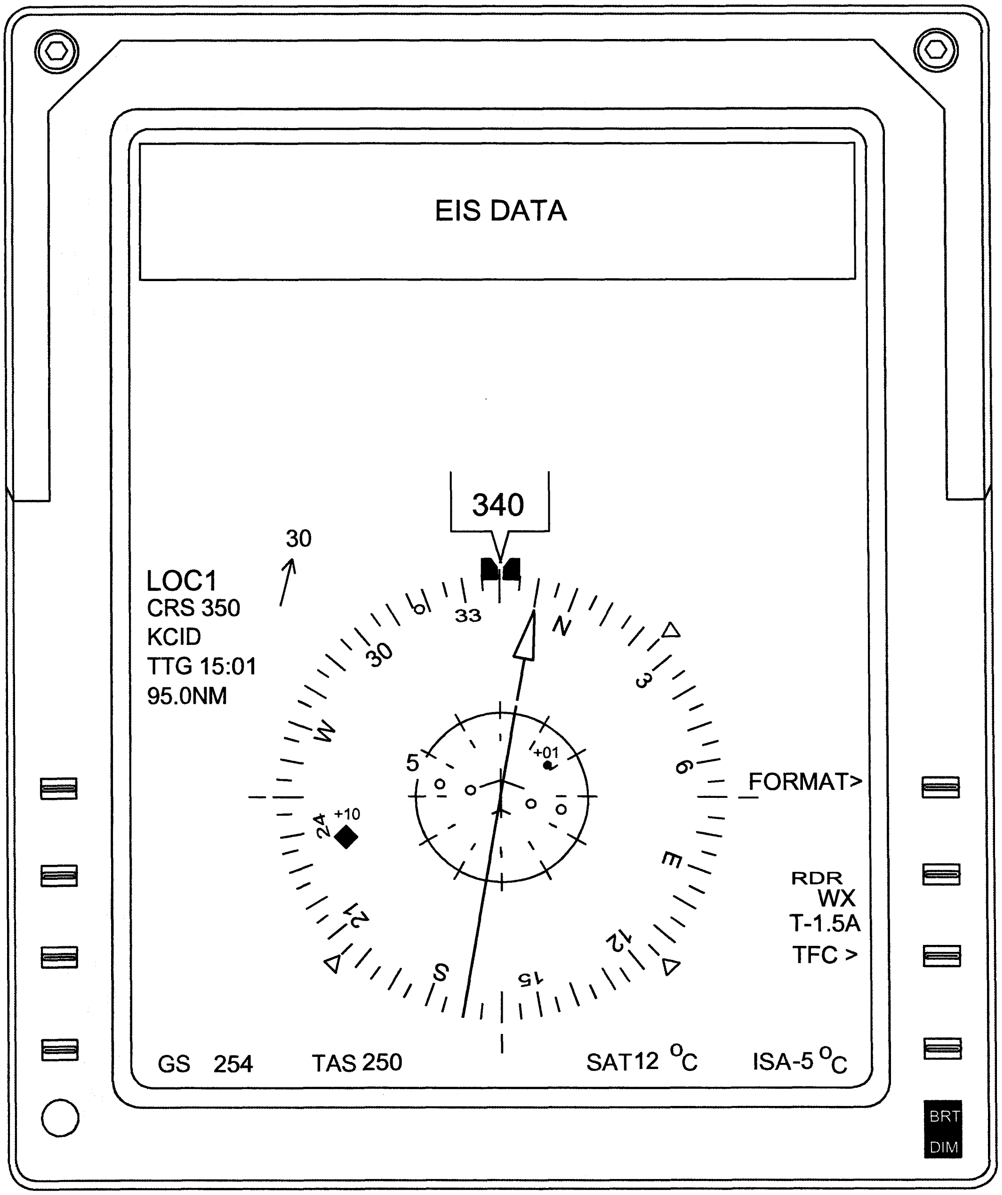
(b) When the TFC [R3] LSK is active, a side-facing cyan caret (>) is shown, which points from the TFC legend to the LSK.

(c) Momentarily push the TFC [R3] LSK on the MFD to overlay the TCAS on the MFD's current display. Momentarily push the LSK again to remove the TCAS overlay. When TFC is actively selected for display, the TFC legend is larger and cyan. When TFC is deselected from the display the TFC legend is smaller and white. If TFC is selected for display, but an incompatible format is then selected, the TFC legend remains larger, but turns white. The TFC legend returns to cyan when a compatible format is selected again.

ROSE Mode	...	When TCAS is overlaid on the ROSE format, a TCAS Half Range ring is shown. This is the ROSE/TCAS Mode *(Figure 6)*. The circle made by the outer edge of the heading tick marks is the Full Range ring. There is normal range control in the ROSE/TCAS mode, but the maximum ROSE/TCAS full range is: 40 NM if Air Transport display ranges are selected. 50 NM if General Aviation display ranges are selected.
ARC Mode	...	When TCAS is overlaid on the ARC format, the ARC range rings become the TCAS range rings. The TCAS Half Range hash marks are added to the ARC's Half Range arc.
MAP Mode	...	When TCAS is overlaid on the MAP format, the MAP range rings become the TCAS range rings. The TCAS Half Range hash marks are added to the MAP's Half Range arc.
TCAS ONLY Display	...	On the MFD, the TCAS ONLY display is the TCAS default (refer to *Figure 7)*. It is shown as the alternative to the ROSE/TCAS mode in PFD Traffic Displays (refer to D.). When the TCAS ONLY format is shown, a TCAS full Range ring and a TCAS Half Range ring are shown. The TCAS 3 NM Range ring is also shown when appropriate. The TCAS ONLY display is only available on the MFD. When TCAS ONLY is shown, radar or optional terrain data, if shown before, will be removed from the display. Radar and optional terrain data can not be selected in TCAS ONLY mode.

(d) With TCAS overlay selected, push the FORMAT [R1] LSK to let other MFD formats be shown. TCAS overlay stays remains active, and TCAS traffic will be overlaid, on TCAS compatible MFD modes, until the TFC [R3] LSK is pushed to deselect the TCAS overlay.

(e) If you continuously push the TFC [R3] LSK for more than 1 second, it will always select the TCAS ONLY format, with the 10 mile Full Range selected.



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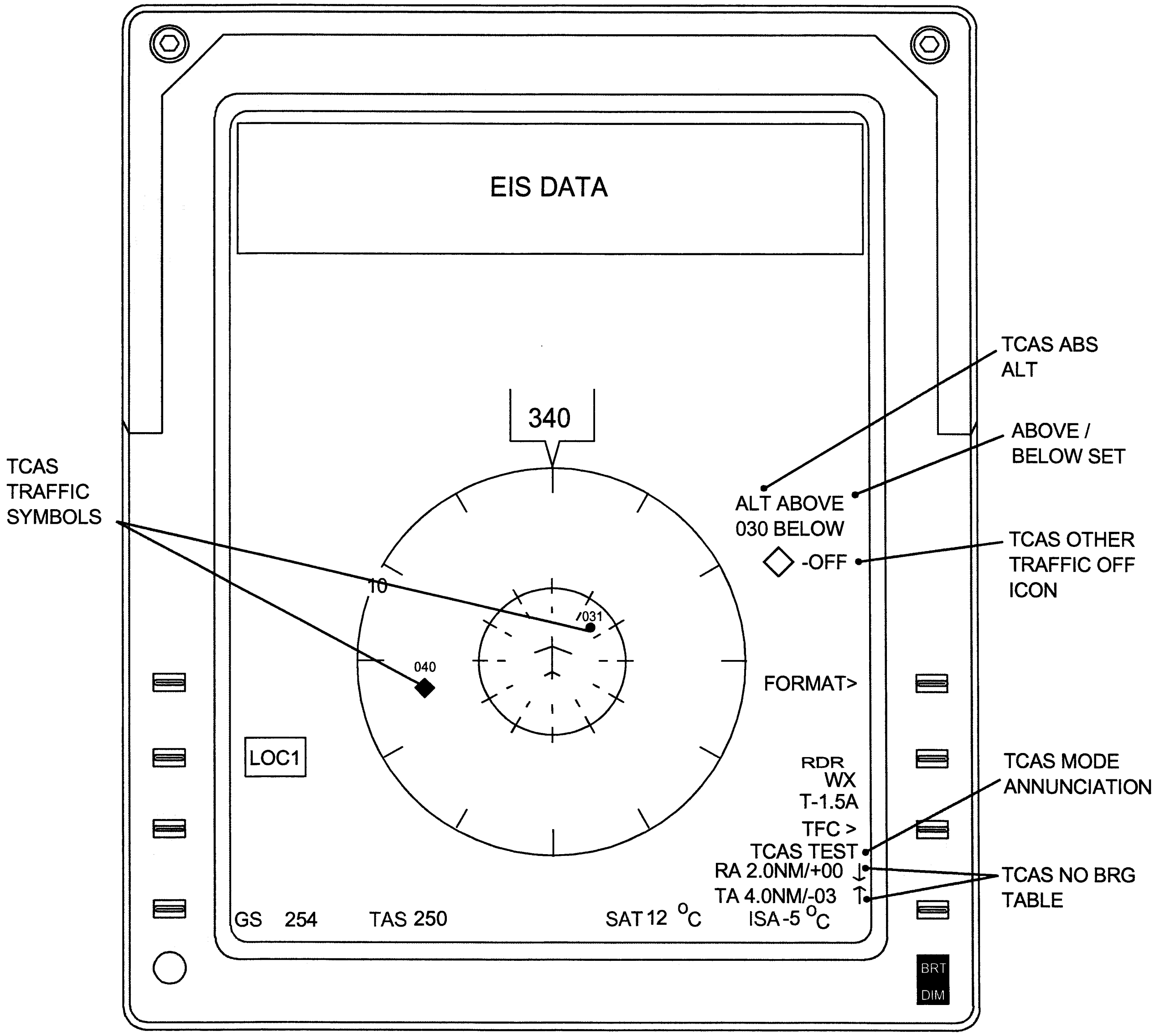
ROSE/TCAS Mode
Figure 6



M5409
HA00B995224AA

TCAS ONLY Mode
Figure 7

NAVIGATION
DEPENDENT POSITION DETERMINING
TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (COLLINS TCAS II)
TROUBLESHOOTING

1. TCAS SYSTEM

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the troubleshooting procedure for the TCAS system.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the troubleshooting procedure for the TCAS system.

TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (COLLINS TCAS II) - REMOVAL/INSTALLATION

1. TCAS system

A. Preliminary procedures

(1) Open, safety and tag the circuit breaker, listed below, before you remove any of the Collins TCAS system.

Panel	Label
DA-A	TCAS

B. TTR 4000 Traffic Transmitter/Receiver removal

(1) Remove access panel F71B/F74A, (Aircraft Flexible Maintenance Schedule, Part 6).

CAUTION: DO NOT LIFT THE TRANSCEIVER UP, OR MOVE FROM SIDE TO SIDE UNTIL THE REAR CONNECTORS ARE COMPLETELY DISENGAGED. THIS IS TO PREVENT DAMAGE TO THE CONNECTOR PINS.

(2) Remove the locking wire and loosen the securing clamps; slide the unit straight out from the mount.

(3) Install protective caps and covers to the electrical connectors.

C. TTR 4000 Traffic Transmitter/Receiver installation

(1) Remove the protective caps and covers from the electrical connectors.

(2) Carefully slide the unit squarely into the mount until the rear connectors are correctly mated. Engage and tighten the securing clamps and wirelock.

(3) Install access panel F71B/F74A, (Aircraft Flexible Maintenance Schedule, Part 6).

(4) Remove the safety tag and close the circuit breaker opened in paragraph 1.A. (Chapter 24, ELECTRICAL POWER).

(5) Do a test of the TCAS system (ADJUSTMENT/TEST).

D. TRE-920 Antenna removal

(1) Remove the sealant from the antenna mounting screw heads.

(2) Remove the mounting screws.

(3) Remove the antenna from the fuselage to the extent allowed by the co-axial cables.

(4) Disconnect the co-axial connections.

(5) Remove the antenna.

(6) Install protective caps and covers to the co-axial connections.

(7) Use a non metallic scraper to remove any polysulphide polymer from the fuselage.

E. Installation

Equipment/Materials	Part/Item No.
Polysulphide Polymer	313 (Chapter 20-95-301)
Cleaner, solvent (MPK)	201 (Chapter 20-95-201)
Aluminum wool	Local supply

(1) Use cleaner, solvent (Item 201) to clean the antenna base and fuselage mating surfaces.

(2) Apply Polysulphide Polymer (Item 313) to the mating surfaces of the antenna base and fuselage (Chapter 20, SEALING OF PRESSURE CABINS).

(3) Remove the protective caps and covers from the co-axial connectors.

(4) Connect the co-axial cable to the antenna.

(5) Install the antenna mounting screws.

(6) Apply Polysulphide Polymer (Item 313) to the screw heads and tighten (Chapter 20, SEALING OF PRESSURE CABINS).

(7) Clean excess Polysulphide Polymer from between the antenna base and the fuselage.

(8) Close the circuit breaker listed in paragraph 1.A.

(9) Do a functional test of the TCAS system (ADJUSTMENT/TEST).

F. Close up

(1) Make sure the work area is clean and clear of all tools and miscellaneous items of equipment.

NAVIGATION
DEPENDENT POSITION DETERMINING
TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (COLLINS TCAS II)
ADJUSTMENT/TEST

1. TCAS SYSTEM

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the TCAS system.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the TCAS system.

NAVIGATION
DEPENDANT POSITION DETERMINING
GLOBAL POSITIONING SYSTEM (GPS-4000A/S)
DESCRIPTION AND OPERATION

1. INTRODUCTION

The GPS-4000A/S global positioning system gives highly accurate worldwide navigation capabilities. The system utilizes signals from 24 space based satellites to determine a three dimensional, precise navigational (longitude, latitude and altitude) airplane position. Description and operation of the GPS-4000A/S Global Positioning receiver and CDU-6200 Control display Unit follows.

2. DESCRIPTION

A. General

The GPS-4000A/S global positioning system processes GPS satellite signals to give navigation data outputs (Ref. Figure 1). The GPS system contains two receivers (Ref. Figure 2) and two antennas (forward and rear). The Collins CDU-6200 Control Display Unit gives backup display pages for GPS navigation data. The GPS receivers process the GPS signals received from the antennas together with inputs from other airplane sensors to give position, velocity and time outputs through the integrated avionics systems processor's input/output data concentrators to the flight management system. The active GPS antenna amplifies and filters the GPS satellite signals.

B. XM Weather Receiver System
(Effectivity: Airplane Serial No. 258744 and After)

The number 1. (forward) GPS antenna is combined with a XM satellite antenna for the XM Weather Receiver System (XMWR) (Ref. 34-40-20, 001). When the XMWR is installed the antenna is connected to the receiver by a co-axial cable. When the XMWR is not installed the co-axial cable is disconnected and stowed; and an antenna termination load is connected to the antenna.

3. OPERATION

A. Collins Control Display Unit (CDU-6200)

There are two identical CDU-6200 Control Display Units which are located on the cockpit center pedestal. The units are identified as CDU No.1 (pilot's side) and CDU No.2 (co-pilot's side) both CDUs can show GPS data.

The CDU -6200 INDEX page is used to select the FMS1 GPS Control display page (Ref. Figure 3). The FMS1 GPS CONTROL display page is used to select a GPS receiver for position data and to deselect all usage of GPS data. The FMS1 GPS CONTROL display page shows the position difference between each GPS receiver position and the flight management computers computed position.

The CDU-6200 INDEX page is used to select the GPS1 display page. The GPS1 display page shows the information that follows from the onside GPS receiver: GPS Time, Date, Latitude, Longitude, Track Angle, Ground Speed, RAIM (Receiver Autonomous Integrity Monitoring) Limit, Probable Error, GPS Mode and Number of GPS Satellites Used.

The RAIM Limit range is 0 to 3.99 NM. The Probable Error range is 0 to 3.99 NM. The GPS mode can be NAV, INITIALIZING, ACQUISITION, ALT-AIDING, TEST, FAIL, SPEED_AIDING or DIFFERENTIAL. The number of satellites used is up to 12.

All GPS position data, date and time are shown in green. If GPS data is flagged or missing, the GPS position Data is replaced with yellow dashes.

B. GPS Controls and Displays

Control or Display		Function/Description
Index page key	…	Push the IDX key to show the INDEX page(s). The INDEX page(s) provide a list of flight management system functions. Some of the INDEX page items access the receiver control pages.
INDEX page 1 (Left side line keys)	…	This display is an index of flight management system functions. The page 1 index functions include FMS 1 VOR CONTROL, FMS1 GPS CONTROL, FMS CONTROL.
NOTE Note that control functions labelled FMS1 are labelled FMS2 for number 2 flight management system.		
INDEX page 1 (Right side line keys)	…	This display is an index of flight management system functions. The page 1 index functions include GPS1 POS, FIX and HOLD.
FMS1 GPS CTL	…	Push this line key to show FMS1 GPS CONTROL page. This page is used to select a GPS receiver for position data and to deselect all usage of GPS position data. The GPS CONTROL display page shows the position difference between each GPS receiver position and the flight management computers computed position. The POS DIFF entry is dashed if insufficient data is available to determine the position difference. When GPS position usage is enabled the <ENABLE> indication appears adjacent to one of the GPS names. Push the line select key adjacent to an enable GPS to cause the GPS to be <DISABLED>.

Control or Display		Function/Description
GPS1 POS key	…	Push the GPS1 POS key to show the GPS1 POS page. The GPS1 POS line key selection shows on the left CDU. GPS2 POS is shown on the right CDU. The GPS position page shows GPS data from the onside GPS receiver. The page shows GPS time and date, latitude, longitude, true track angle, groundspeed, RAIM limit, probable error, the GPS operating mode and the number of GPS satellites currently being used.

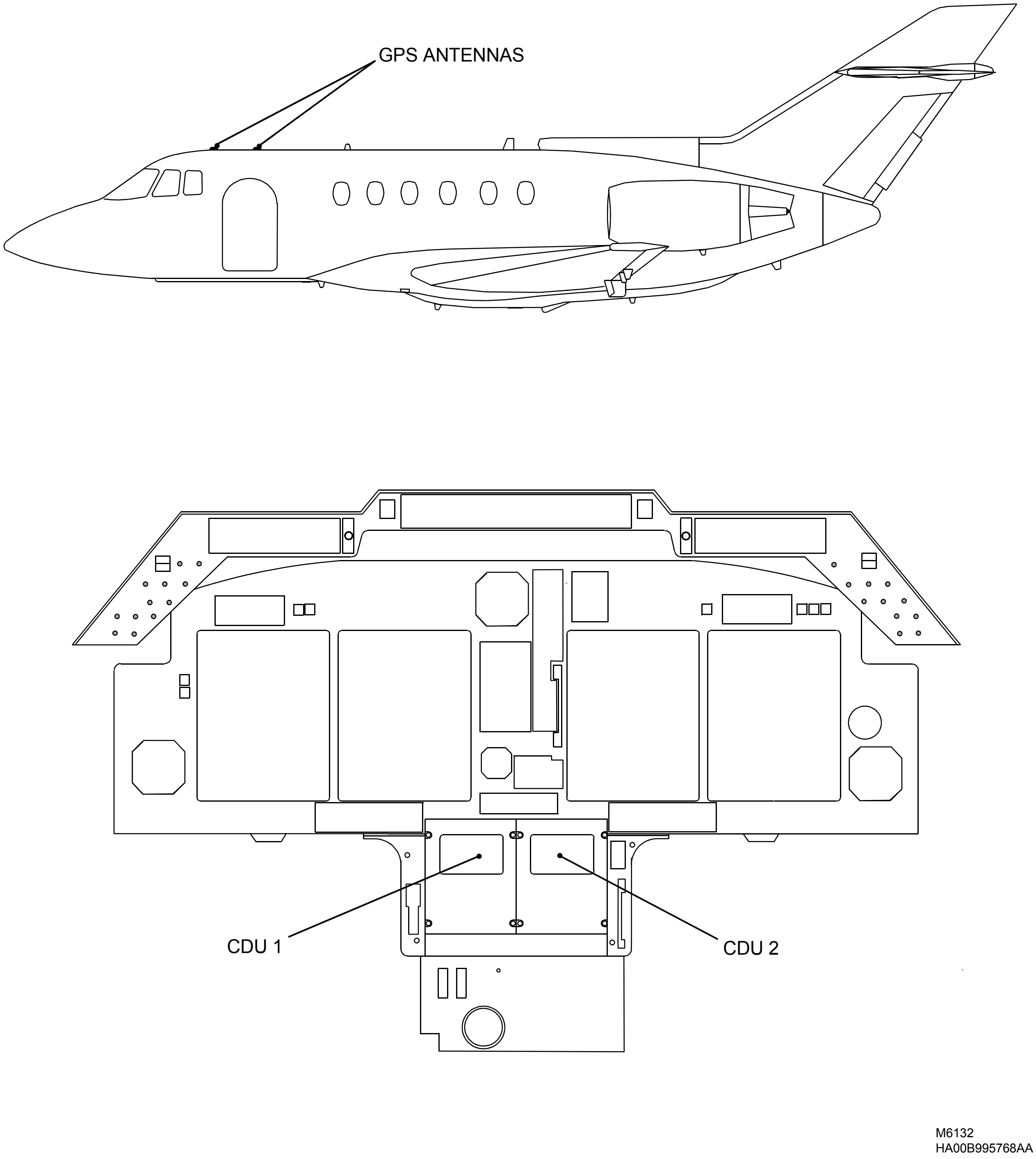


Figure 1
GPS-4000A/S Antenna and CDU Locations

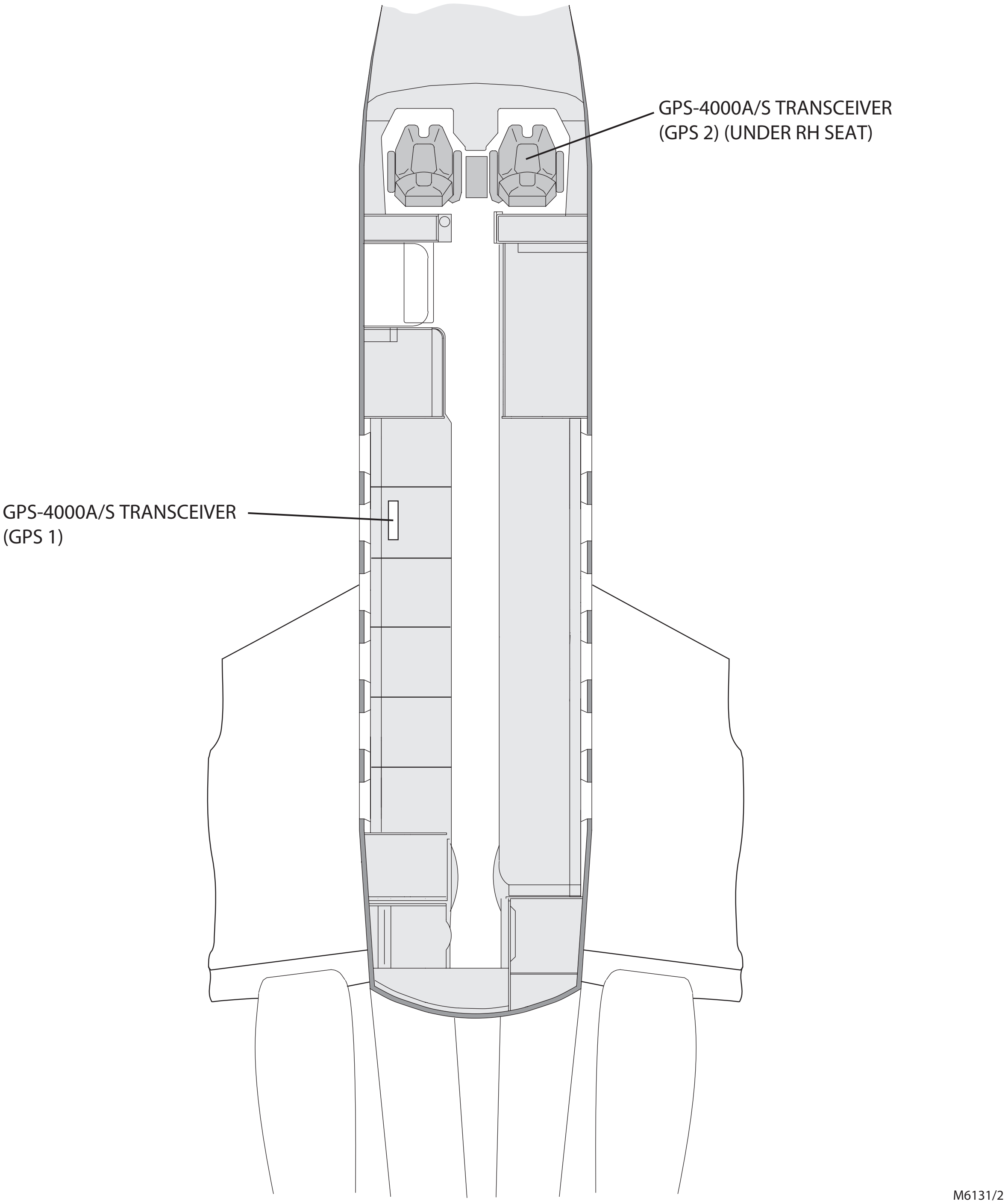
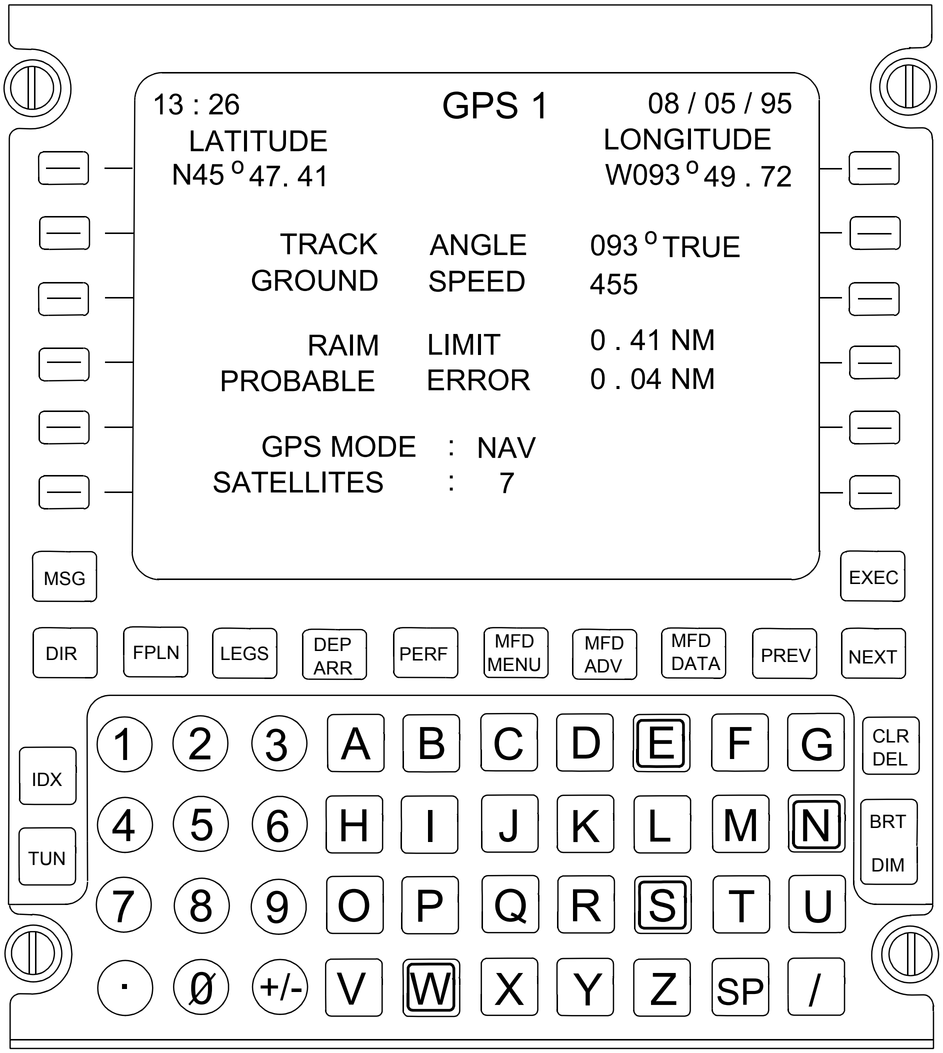


Figure 2
GPS-4000A/S Receiver Locations



13 : 26 GPS 1 08 / 05 / 95

LATITUDE N45 ° 47. 41

LONGITUDE W093 ° 49 . 72

TRACK ANGLE 093 ° TRUE

GROUND SPEED 455

RAIM LIMIT 0 . 41 NM

PROBABLE ERROR 0 . 04 NM

GPS MODE : NAV

SATELLITES : 7

M6130
HA00B995766AA

Figure 3
GPS-4000A/S Position Page

4. COMPONENTS

A. Collins GPS-4000A/S Receiver

There are two GPS-4000A/S receivers:

- GPS1 receiver is rack mounted and located between frame 11 and frame 12 under the floor. This is powered by 28 VDC from PE bus.
- GPS2 receiver is rack mounted and located in the flight deck under the right seat. This is powered by 28 VDC from PS2 bus.

GPS signals which are received, amplified and filtered by the GPS antenna along with inputs from other airplane sensors are supplied to the receiver which processes them to provide position, velocity and time outputs through the input/output data concentrators to the flight management system. Latitude, longitude, range, velocity, track data and time are supplied to the Weather Radar and Enhanced Ground Proximity Warning Systems in addition to the flight management system via the ARINC 429 data bus.

B. GPS Antenna

The GPS antennas provide the GPS-4000A/S receivers with radio frequency signals from GPS satellites. The antennas are passive receive only devices which operate within the L-band frequency of 1575.42± 10 MHz. The antennas which use right hand circular polarization, are a microscopy patch type design. The antennas have an impedance of 50 ohms.

NAVIGATION
DEPENDENT POSITION DETERMINING
GLOBAL POSITIONING SYSTEM (GPS-4000A/S)
REMOVAL/INSTALLATION

1. INFORMATION

Equipment/Materials	Part/Item No.
Cleaner, solvent	201 (Ref. AMM 125/H-20, 20-95-201)
Polysulfide sealant	347 (Ref. AMM 125/H-20, 20-95-301)
Wire, corrosion resistant	651 (Ref. AMM 125/H-20, 20-95-601)
Aluminum wool	Local supply

A. Preliminary Procedures

	MECH	INSP
(1) Open, safety and tag the relevant circuit breakers, listed below, before you remove any of the GPS System. **Panel** — **Label** DA-A — GPS 1 DA-A — GPS 2 DA-A — XM XWR (if installed)		

2. GPS SYSTEM

A. GPS-4000A/S Receiver (No. 1) Removal

	MECH	INSP
(1) Do the preliminary procedures (paragraph 1.A.).		
(2) Remove the relevant floor panels (AFMS-800XP, Part 6) to get access to GPS receiver No.1, situated between frame11 and frame 12.		
CAUTION *Do not lift the receiver up, or move from side to side until the rear connectors are completely disengaged. This is to prevent damage to the connector pins.* (3) Remove the lock wire and loosen the attachment clamps; slide the unit straight out from the mount.		
(4) Install protective caps or covers to the electrical connectors.		

B. GPS-4000A/S Receiver (No. 1) Installation

	MECH	INSP
(1) Remove the protective caps or covers from the electrical connectors.		
(2) Carefully slide the unit squarely into the mount until the rear connectors are correctly mated. Engage and tighten the attachment clamps and lock with wire (Item 651).		
(3) Install floor panels removed in paragraph 2.A.(2) (AFMS-800XP, Part 6).		
(4) Remove the safety clips and tags, and close the circuit breakers opened in paragraph 1.A.		
(5) Do a functional test of the GPS system (Ref. 34-50-45, 501).		

C. GPS-4000A/S Receiver (No. 2) Removal

	MECH	INSP
(1) Do the preliminary procedures (paragraph 1.A.).		
(2) Get access to GPS receiver No.2 on the flight deck, under the right seat.		
CAUTION *Do not lift the receiver up, or move from side to side until the rear connectors are completely disengaged. This is to prevent damage to the connector pins.* (3) Remove the lock wire and slacken the attachment clamps; slide the unit straight out from the mount.		
(4) Install protective caps or covers to the electrical connectors.		

D. GPS-4000A/S Receiver (No. 2) Installation

	MECH	INSP
(1) Remove the protective caps or covers from the electrical connectors.		
(2) Carefully slide the unit squarely into the mount until the rear connectors are correctly mated. Engage and tighten the attachment clamps and lock with wire (Item 651).		
(3) Install any access panels removed in paragraph 2.C.(2).		
(4) Remove the safety clips and tags, and close the circuit breakers opened in paragraph 1.A.		
(5) Do a functional test of the GPS system (Ref. 34-50-45, 501).		

E. GPS-4000A/S No.1 (Forward) Antenna Removal (Effectivity: Airplanes Prior to Serial No.258744)

	MECH	INSP
(1) Do the preliminary procedures (paragraph 1.A.).		
(2) To get access to the No.1 antenna, remove roof panels to access the airplane skin between frames 7 and 8 (Ref. Figure 401).		
(3) Disconnect the co-axial cable connector from the antenna.		
(4) Remove the screws which attach the antenna and contoured shim to the airplane.		
(5) Remove the antenna and contoured shim.		
(6) Install protective caps and covers to the antenna connections.		
(7) Carefully remove any remaining old sealant from the contoured shim, airplane skin and attachment hardware.		

F. GPS-4000A/S No.1 (Forward) Antenna Installation (Effectivity: Airplanes Prior to Serial No.258744)

	MECH	INSP
(1) Make sure the bonding areas of the attachment screws, antenna and contoured shim mating surfaces are not damaged or contaminated (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.).		
(2) Clean the mating surfaces of the antenna and the contoured shim with cleaner, solvent (Item 201) and aluminum wool (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.1. through 7.J.4.).		
(3) Put the antenna in position with the contoured shim and attach with screws. Seal the periphery of the antenna, contoured shim and the heads of the screws with Polysulphide sealant (Item 347) (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.5. through 7.J.8.).		
(4) Remove the cap and cover from the connectors and attach the co-axial cable to the antenna.		
(5) Install the roof panels.		
(6) Remove the safety clips and tags, and close the circuit breakers opened in paragraph 1.A.		
(7) Do a functional test of the GPS system (Ref. 34-50-45, 501).		

G. GPS-4000A/S No.1 (Forward) Antenna Removal (Effectivity: Airplanes Serial No.258744 and After)

	MECH	INSP
(1) Do the preliminary procedures (paragraph 1.A.).		

	MECH	INSP
(2) To get access to the No.1 antenna, remove roof panels to access the airplane skin between frames 7 and 8 (Ref. Figure 401).		
(3) For Airplanes with XM Weather Receiver (XMWR) installed: (a) Disconnect the GPS co-axial cable connector from the antenna (blue band port). (b) Disconnect the XMWR co-axial cable connector to the antenna (red band port).		
(4) For Airplanes without XMWR installed: (a) Disconnect the GPS co-axial cable connector from the antenna (blue band port). (b) Disconnect and retain the antenna termination load connector to the antenna (red band port).		
(5) Remove the screws which attach the antenna and contoured shim to the airplane.		
(6) Remove the antenna and contoured shim.		
(7) Install protective caps and covers to the antenna connections.		
(8) Carefully remove any remaining old sealant from the contoured shim, airplane skin and attachment hardware.		

H. GPS-4000A/S No.1 (Forward) Antenna Installation (Effectivity: Airplanes Serial No.258744 and After)

	MECH	INSP
(1) Make sure the bonding areas of the attachment screws, antenna and contoured shim mating surfaces are not damaged or contaminated (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.).		
(2) Clean the mating surfaces of the antenna and the contoured shim with cleaner, solvent (Item 201) and aluminum wool (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.1. through 7.J.4.).		
(3) Put the antenna in position with the contoured shim and attach with screws. Seal the periphery of the antenna, contoured shim and the heads of the screws with Polysulphide sealant (Item 347) (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.5. through 7.J.8.).		
(4) For Airplanes with XM Weather Receiver (XMWR) installed: (a) Remove the cap and cover from the connector and attach the GPS co-axial cable connector to the antenna (blue band port). (b) Remove the cap and cover from the connector and attach the XMWR co-axial cable connector to the antenna (red band port).		

	MECH	INSP
(5) For Airplanes without XMWR installed: (a) Remove the cap and cover from the connector and attach the GPS co-axial cable connector to the antenna (blue band port). (b) Remove the cap and cover from the connector and attach the retained antenna termination load connector to the antenna (red band port).		
(6) Install the roof panels.		
(7) Remove the safety clips and tags, and close the circuit breakers opened in paragraph 1.A.		
(8) Do a functional test of the GPS system (Ref. 34-50-45, 501).		

I. GPS-4000A/S No.2 (Rear) Antenna Removal

	MECH	INSP
(1) Do the preliminary procedures (paragraph 1.A.).		
(2) To get access to the No.2 antenna, remove roof panels to access the airplane skin between frames 9 and 9A (Ref. Figure 401).		
(3) Disconnect the co-axial cable connector from the antenna.		
(4) Remove the screws which attach the antenna with the contoured shim to the airplane.		
(5) Remove the antenna and contoured shim.		
(6) Install protective caps and covers to the antenna connections.		
(7) Carefully remove any remaining old sealant from the contoured shim, airplane skin and attachment hardware.		

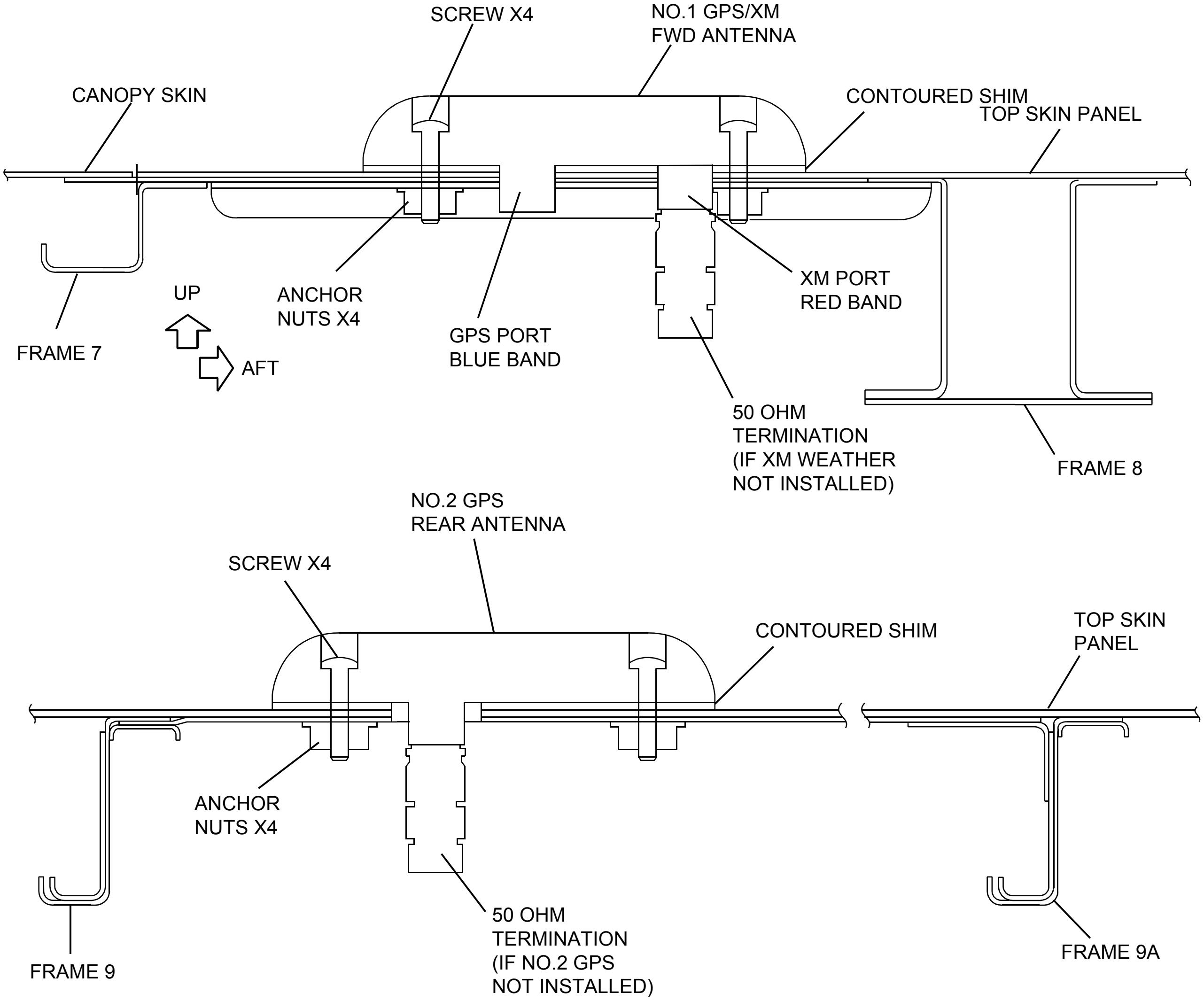
J. GPS-4000A/S No.2 (Rear) Antenna Installation

	MECH	INSP
(1) Make sure the bonding areas of the attachment screws, antenna and contoured shim mating surfaces are not damaged or contaminated (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.).		
(2) Clean the mating surfaces of the antenna and the contoured shim with cleaner, solvent (Item 201) and aluminum wool (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.1 thru 7.J.4).		
(3) Put the antenna in position with the contoured shim and attach with screws. Seal the periphery of the antenna, contoured shim and the heads of the screws with Polysulphide sealant (Item 347) (Ref. AMM 125/H-20, 20-10-5016, 201 procedure 7.J.5. through 7.J.8.).		
(4) Remove the cap and cover from the connectors and attach the co-axial cable to the antenna.		

	MECH	**INSP**
(5) Remove the safety clips and tags, and close the circuit breakers opened in paragraph 1.A.		
(6) Install the roof panels.		
(7) Do a functional test of the GPS system (Ref. 34-50-45, 501).		

K. Close Up

	MECH	**INSP**
(1) Make sure the work area is clean, clear of tools and other items of equipment.		



HA34B035955AA.AI

Figure 401
Forward GPS/XM and Rear GPS Antenna - Removal/Installation

NAVIGATION
DEPENDENT POSITION DETERMINING
GLOBAL POSITIONING SYSTEM (GPS-4000A/S)
ADJUSTMENT/TEST

1. GPS-4000A/S SYSTEM

A. GPS-4000A/S Receiver Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the GPS system.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the GPS system.

B. GPS-4000A/S Antenna Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the GPS system.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the GPS system.

C. XM Satellite Antenna Test (Effectivity: Airplane Serial No. 258744 and After, With XM Weather System Installed)

(1) Do the XM Weather System Antenna test procedure (Ref. 34-40-20-201).

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
FLIGHT MANAGEMENT SYSTEM (FMS-6000)
DESCRIPTION AND OPERATION

1. DESCRIPTION

A. General

The Flight Management System (FMS-6000) has the LRUs that follow:

- Two CDU-6200 Control Display Units.
- Two FMC-6000 Flight Management Computers (IAPS module).
- Two GPS-4000A or GPS-4000S Global Positioning Sensors.
- DBU-4100 or DBU-5000 Data Base Unit

The FMS-6000 satellite-based navigation system provides the capability of en route, terminal, and nonprecision approach lateral navigation. The system contains an advanced Global Positioning System (GPS) receiver, and processes the transmissions from multiple GPS satellites simultaneously to calculate navigation solutions based on information from all satellites in view. A minimum of four satellites with acceptable geometry, or three satellites plus calibrated barometric altitude, are required in order to calculate a navigation solution. With additional satellites, the system can improve the fault tolerance and accuracy of the navigation solution and provide Receiver Autonomous Integrity Monitoring (RAIM) to detect satellite failures. The system also provides predictive RAIM, which is used to determine whether the satellite geometry at the destination airport will be sufficient to support approach at the planned time of arrival. The computed GPS position, velocity and time is input to the Flight Management function, which integrates this data into the flight plan based navigation solution. Attitude/Heading System (AHS), Air Data Computer (ADC), Distance Measuring Equipment (DME) and VHF Omnidirectional Range (VOR) also send data for use by the FMS. The FMS provides necessary controls for all input sensors, when appropriate.

The FMS allows the pilot to specify where he wants to fly the airplane, and then provides lateral and vertical guidance to get there.

The FMS can be initialized, waypoints chosen, and destination selected by a variety of pilot friendly means. Standard Instrument Departures (SIDs), Standard Terminal Arrival Routes (STARs), and Airways are accommodated. A great circle route is calculated between waypoints for enroute lateral navigation, and roll steering is provided to the Flight Control System (FCS). A sophisticated interface with the FCS lets the FMS Vertical Navigation (VNAV) function select various FCS vertical modes of navigation. This sophisticated VNAV interface is often referred to as “Coupled VNAV”. The FMS provides vertical steering when appropriate. The FMS interfaces with the Data Base Unit (DBU) to update its internal Data Base (DATA BASE UNIT). The FMS data base includes specific airplane data to enable calculation of N_1 references in addition to take off Vspeeds. It interfaces with the EFIS Displays to supply conventional navigation data and state-of-the-art map presentation, and supplies N_1 Thrust Reference and Vspeed data.

B. Operational Requirements

The system provides lateral and vertical navigation capability for the en route, terminal, and non-precision approach airspace navigation sectors. The system can show the parameters that follow:

- Accurate position and velocity determination using GPS, VOR, and DME sensor data. The system can use either single or dual Inertial Reference Units (IRUs) as a long range sensor.
- Multiwaypoint lateral and vertical flight plan management including flight planning, flight plan creation, editing, saving, and loading to/from disk.
- SIDs.
- STARs.
- Airways.
- Holding patterns.
- Direct - To and intercept course.
- Parallel offsets.
- GPS Primary Means Navigation.
- GPS NPAs.
- RNAV.
- Measured Fuel.
- Alternate Airport.
- Pilot defined routes.
- Pilot defined waypoints.
- Computation of short term navigation parameters such as desired track, cross track distance, ground speed, vertical deviation, etc.
- Format of computed flight plan progress and history parameters, and maps.
- Computation of lateral and vertical steering commands for use by the flight guidance system.
- Automatic FMS to ILS capture transitions.
- Fuel and Performance Tables.
- Thrust Tables.
- Operation in independent or synchronized mode.
- To tune the Navigation/Communication Radio.
- Back-up GPS position display.

C. PFD Track Pointer

The Track Pointer is shown on the Compass Rose or Heading Arc at the current airplane track over the earth. The drift angle is read as the difference between the position on the Track Pointer and the Lubber Line. Thus the pointer can also be referred to as a Drift Pointer.

D. PFD Wind Display

The Wind Speed Magnitude and Direction arrow are shown to the left of the Lubber Line. By convention, Wind Direction is always shown as the direction the wind comes from, therefore the direction arrow may be interpreted with respect to the Horizontal Situation Indicator (HSI)/Arc’s Aircraft Symbol. Winds are automatically calculated by the FMS.

E. PFD Lateral Navigation Course and Deviation Display

The Primary Flight Display (PFD) shows the active Navigation (NAV) data on and adjacent to the Compass Rose, Arc or Map. The pilot tunes the appropriate Navigation radio to the desired ground station, or enters the flight plan via the CDU. The NAV/BRG menu is used to select the current NAV and Bearing (BRG) display sources. Push the NAV/BRG button on the Display Control Panel (DCP) to enable the NAV/BRG menu. A “Solid Box” is shown around the current navigation source selection. The Solid Box is moved around the menu page with the MENU ADV rotary switch on the DCP to the item the pilot wants to make active. Push the PUSH MENU SET button on the DCP to make the selected item become active. Use the Line Select Keys (LSKs) on the PFD, when the NAV/BRG menu shows, to make the navigation source selection. Push the associated LSK of a navigation source to make the next available Navigation source become active.

F. PFD Nav to Nav Capture

Nav to Nav capture lets an ILS be selected as the approach guidance for the airplane at the end of an FMS flight plan. With the on-side FMS as the active Nav source, Nav to Nav capture is enabled on the CDU, and the FMS commands a Preselect Nav source of the on-side ILS to be shown on the PFD. The system continues to display and fly the FMS as the active Nav source until the FCS determines LOC capture occurs. At that point, the FMS is automatically deselected as the active Nav source and is replaced by the captured LOC source.

G. PFD Distance Display (Active Nav Source)

The Distance Display provides Nautical Miles (NM) Distance information to the pilot. Distance is usually associated with the active Nav source, and thus provides distance to the next waypoint for FMS, distance to the VOR station for VOR, and distance to runway for LOC/MLS.

H. PFD Bearing Pointer Displays

Two bearing pointers can be shown on the Compass Rose, Arc or optional Map format.

I. PFD ILS/MLS Vertical Deviation Display

If LOC is the preselect or active course, or MLS MAZ is the active course, Glideslope (GS) Deviation, or MLS Glidepath (MGP), is shown between the attitude ball and the altitude dial. GS and MGP displays are mutually exclusive. The vertical deviation is shown as a pointer against a vertical analog scale.

J. PFD VNAV Deviation Display

VNAV Deviation can be shown on the Vertical Deviation scale between the attitude ball and the altitude tape. It is usually shown when FMS is the active Nav source.

K. PFD Map Display

The PFD has a map display of FMS supplied navigation aids which are in the area which surrounds the airplane. This Present Position Map (PPOS) is shown in the lower part of the PFD, and surrounds the Airplane Symbol and is below the Heading Arc. This mode is selected for display with the PFD FORMAT LSK. The map is a heading-up map which shows the radius around the airplane that was selected with the RANGE knob. If there is a flight plan in the FMS, the flight plan legs are shown with solid lines which connect the waypoints.

The active Nav source, FMS1/FMS2, remains annunciated on the left side of the map to identify the source of the map. MFD exclusive “MAP features” such as Plan Map, Text displays and extended present position MAP display are not available on the PFD Map Display.

L. PFD FMS Message Window

The FMS annunciates various FMS messages on the PFD. The upper line is referred to as “A1” and the lower as “A2”.

M. PFD FMS Status Field

The FMS annunciates various FMS status messages on the FMS Status Field on the PFD. The line is referred to as “A3”.

N. PFD Universal Time

Universal Time (UTC) is shown on the bottom of the PFD.

O. MFD Ground Speed and Wind Display

Ground Speed, GS, is shown on the MFD Data Line. The Wind Speed Magnitude digital readout, and the wind direction arrow, are shown to the left of the MFD's Heading Display. The source of Ground Speed and Wind are the same on the MFD as they are on the PFD, except when a Map is shown on the MFD. When a Map is shown on the MFD, the FMS that is the source of the Ground Speed and Wind is the same one that supplies the Map. The MFD Wind Displays are the same as the PFD's Wind Displays.

P. MFD Heading Display, Format Selection, PPOS Map

The MFD shows Heading data for all MFD Formats except Plan Map, FMS Text Only, and Maintenance format. The symbology varies for different Formats, but is almost the same as the PFD’s display of the same data.

Q. MFD Lateral Navigation Display

In the ROSE or ARC Format the MFD shows Lateral Navigation data from the same source that is currently selected on the PFD as the active Nav Source. The PPOS Map also shows a limited amount of active Nav Source data (Desired Track, Waypoint ID, Distance, Time To Go) when the active Nav source and the Map source are the same FMS.

R. MFD Bearing Pointer Display

Two bearing pointers can be shown on the Rose, ARC, or PPOS MAP, and are almost the same as on the PFD display.

S. MFD Plan Map Format

The Planning Map (Plan Map) is a True north-up navigation map display selected for display with the MFD FORMAT LSK. The Plan Map is always referenced to true North. The Plan Map display uses the Navaid symbology determined by the FMS.

T. MFD FMS Text Only Format

The FMS Text Only Format shows only FMS Text data on the MFD below the engine display. It replaces the normal MFD navigation display.

U. MAP Interface

The FMS provides both PPOS and Plan Maps. These Maps help orient the pilot to his path over the earth, and they help the pilot create a Flight Plan.

2. OPERATION

NOTE: There are eight Line Select Keys (LSK) on each PFD and MFD - four at the bottom left and four at the bottom right of each display. Throughout this procedure, the numbering of the LSKs is specified as:
Keys on the left side of the display are referred to as [L1] LSK (top) thru [L4] LSK (bottom).
Keys on the right side of the display are referred to as [R1] LSK (top) thru [R4] LSK (bottom).

NOTE: LSKs which are currently active have a side-facing caret (< or >) which points from their related legend to the LSK. Some menus may place legends near different LSKs when the LSK has no function. The absence of the side-facing caret shows the LSK has no function.

A. PFD Track Pointer

(1) Controls

None

(2) Annunciations

An open, circle-shaped pointer is shown (Ref. Figure 1), regardless of the active Nav source, on the Heading Rose or Arc at the current airplane track. The source of the Track Pointer is the on-side FMS, unless the cross-side FMS is the active Nav source. The Track Pointer is usually green, but is amber if the cross-side FMS is the active Nav source.

B. PFD Wind Display

(1) Controls

None

(2) Annunciations

(a) Up to 3 digits of Wind Magnitude are shown to the left of the compass Lubber Line. A Direction Arrow is adjacent to the Magnitude readout. The Arrow shows the wind direction relative to the airplane (arrow to 6 o'clock = direct head wind).

(b) Wind Magnitude and Direction are shown regardless of the active Nav source, and their source is the on-side FMS, unless the cross-side FMS is the active Nav source. The Wind Magnitude and Direction are usually green, but are amber if the cross-side FMS is the active Nav source.

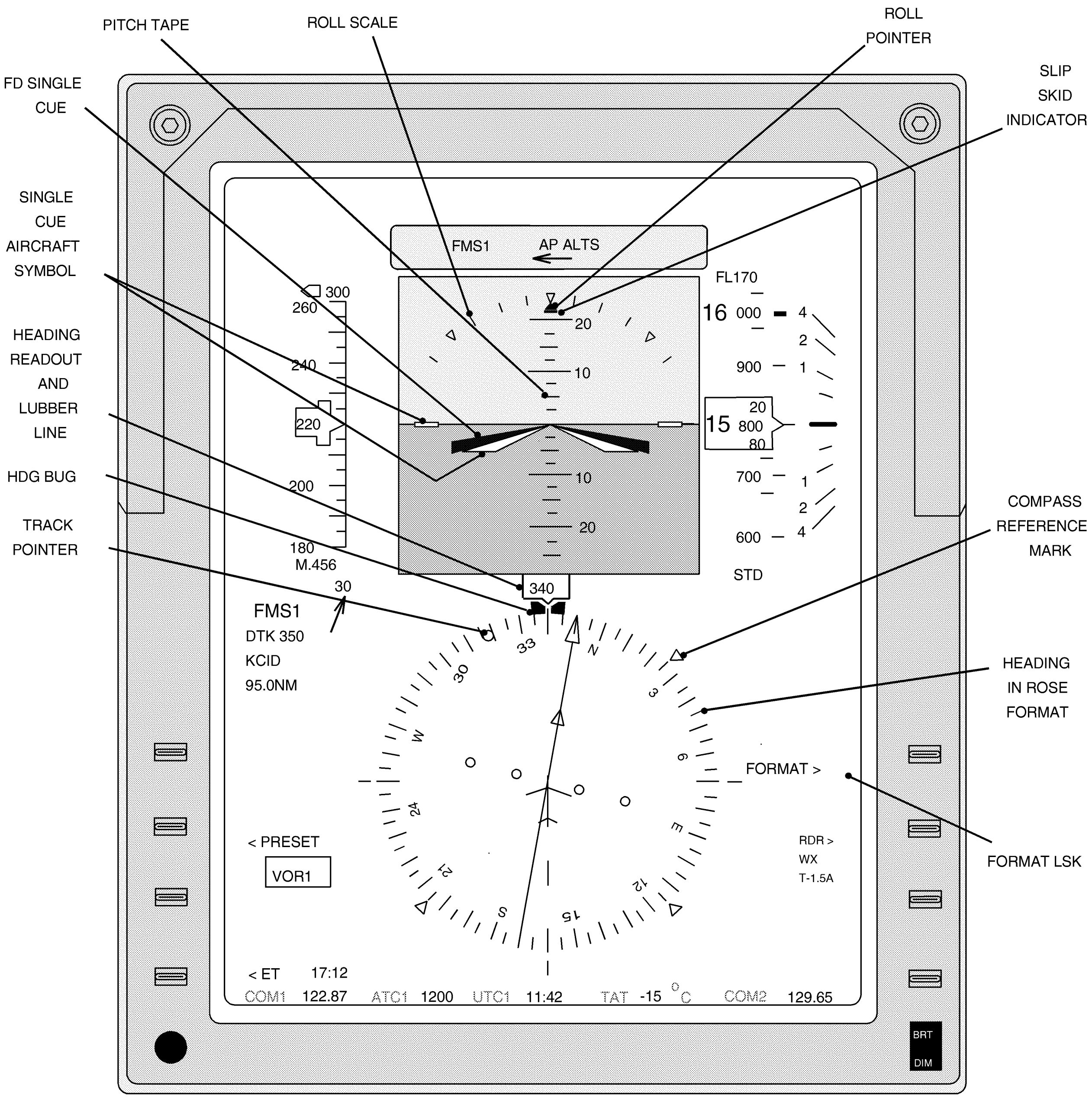
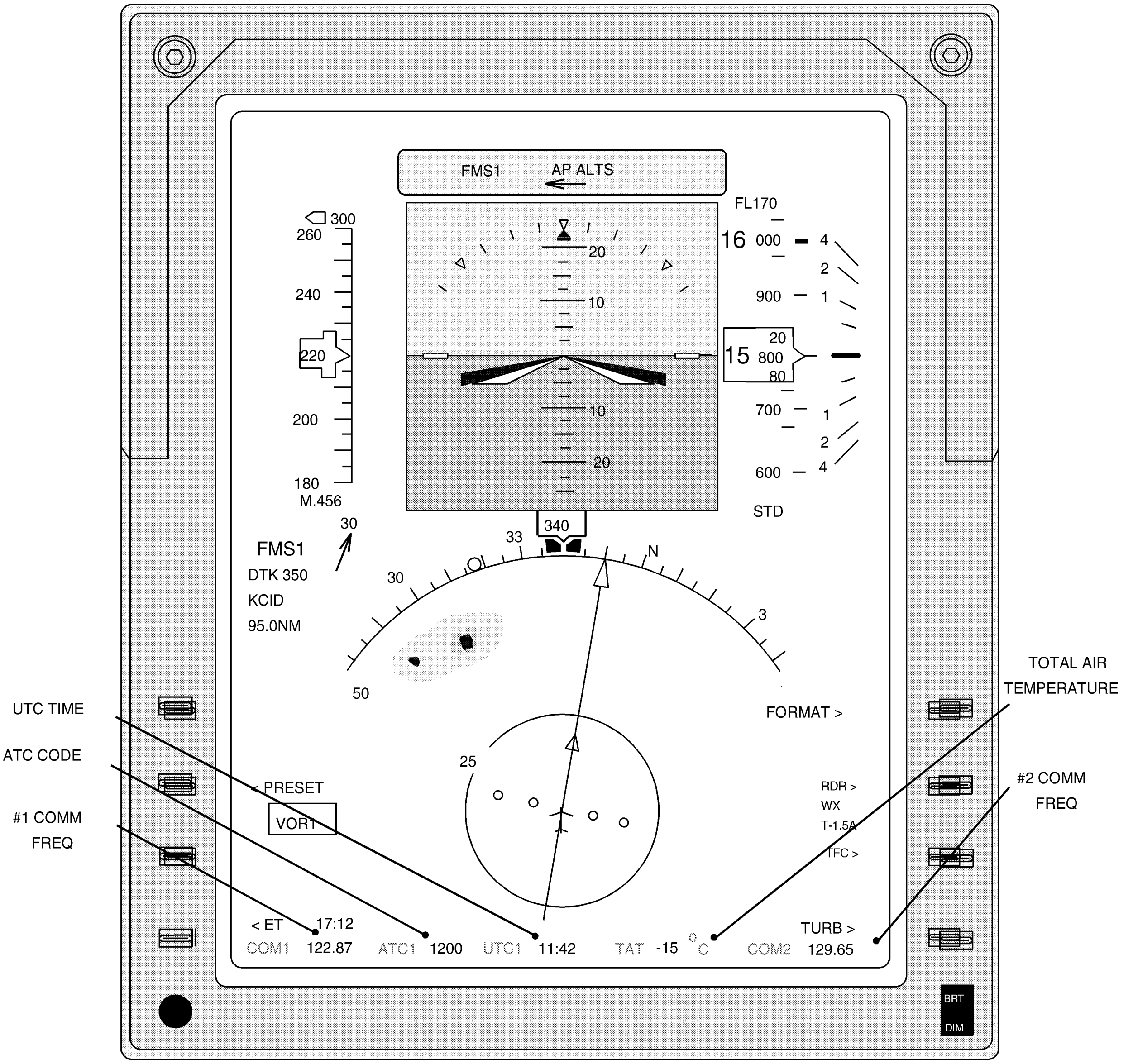


Figure 1
Heading Display



M5823
HA00B995460AA

Figure 2
Nav Source and Course Readout

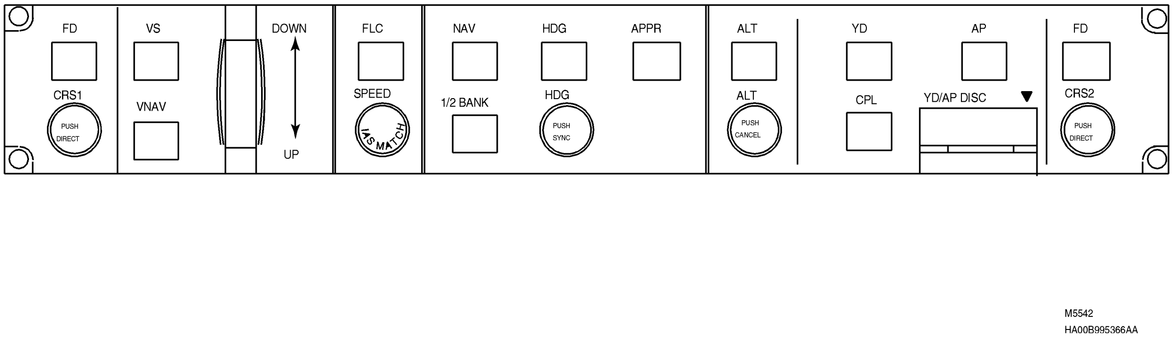


Figure 3
Flight Guidance Panel

C. PFD Lateral Navigation Course and Deviation Display

(1) Controls

(a) The CRS1 and CRS2 rotary switches on the Flight Guidance Panel (FGP) (Ref. Figure 3) set their respective Adaptive Flight Display's (AFD's) active VOR or (Localizer) LOC Course Pointer (Ref. Figure 2).

(b) PUSH DIRECT (in the center of the CRS rotary switch) automatically selects a course directly to the on-side AFD's valid VOR station, if VOR is the active Nav source.

(c) The NAV/BRG Menu is used to select the desired Nav source (Ref. Figure 4).

i. Push the NAV/BRG push button on the DCP to select the NAV and BRG SOURCE Menu. A white "NAV SOURCE" Menu Title, on a sky blue background, is shown on the left side of the PFD and the white "BRG SOURCE" Menu Title, on a sky blue background, is on the right side of the PFD. The respective menus are shown beneath each Title. The NAV/BRG SOURCE Menu is removed by pushing the NAV/BRG, REFS or RADAR push buttons while the Menu is shown.

ii. Turn the DCP's MENU ADV rotary switch moves the Solid Box to the desired NAV SOURCE. Push the PUSH MENU SET button to select the currently boxed NAV SOURCE as the active NAV SOURCE. The newly selected active NAV SOURCE is now larger and green (on-side) or amber (cross-side), the deselected active NAV SOURCE is smaller and white.

iii. Bearing selections are made in a similar manner. Currently, active selections are shown in larger text, inactive selections are smaller and white text. Turn the Solid Box to the desired Bearing selection, and push the PUSH MENU SET button to make that Bearing Pointer be selected as active. The associated text becomes larger and magenta (first Bearing Source), or cyan (second Bearing Source), and the previous selection's text becomes smaller and white.

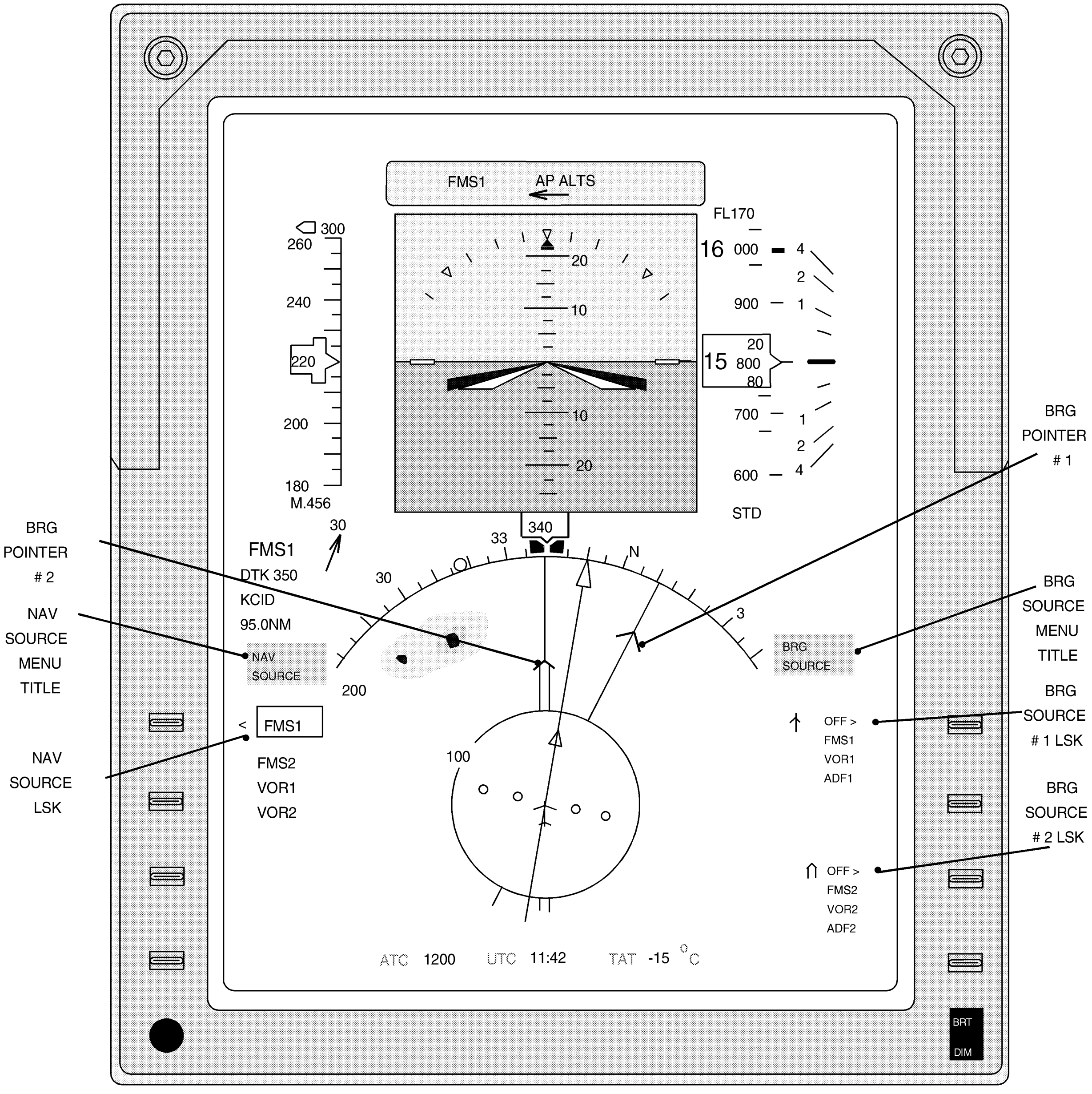


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Figure 4
NAV/BRG Menu

(2) Annunciations.

Course Pointer (on Compass Display)	The Course Pointer is a wide, single bar arrow on the Compass Rose or Arc. It is green if it is from the on-side Nav source and amber if it is from the cross-side Nav source. The Course Pointer always points to the same value as the Course/Desired Track Readout.
To/From Indicator (on Compass Display)	The To/From Indicator is a triangular pointer, the same color as the Course Pointer, which is shown when the active Nav source is valid VOR or valid FMS. To:The triangle points in the same direction as the Course Pointer head. From:The triangle points in the opposite direction to the Course Pointer head.
Aircraft Symbol (on Compass Display)	The Aircraft Symbol is a representation of the airplane in the center of the compass, with its nose pointing to the Lubber Line. The white Aircraft Symbol is a stick type symbol for Rose and Arc formats, and an outline shape for the optional Map format.
Lateral Deviation Bar (on Compass Display)	This is the center portion of the Course Pointer, and is the same width and color as the Course Pointer. It moves left or right of the Aircraft Symbol to show the relative position of the course to the airplane, and moves an amount proportional to the magnitude of the deviation.
Lateral Deviation Scale (on Compass Display)	This is a white scale, perpendicular to the Course Pointer, which turns with the Course Pointer. It has a scale marking of 2 white dots left and 2 white dots right of the center line of the Course Pointer compass.
Lateral Deviation Scale (on Attitude Display)	The Lateral Deviation Scale is in a “cut-out section” at the bottom of the Attitude Display. The scale has 2 grey dots on either side of a grey center tickmark. The background is black. The scale comes into view as a function of the selection of MLS or LOC as the active Nav source.
Lateral Deviation Pointer and Flag (on Attitude Display)	This is the Pointer on the Lateral Deviation Scale, and is the same color as the Nav Source annunciation. The Pointer is a waypoint shape for FMS and a diamond shape for all other Nav sources. The Pointer movement is automatically reversed by the AFD when Backcourse localizer logic is active.
Active Nav Source	The currently selected active Nav Source of VOR1, VOR2, LOC1, LOC2, FMS1 or FMS2 is shown to the left of the compass arc. It is green if it is the on-side source, amber if it is the cross-side source. Whenever a LOC or VOR is selected as the active Nav Source, the 5 digit Nav Source frequency, with decimal point, is shown to the right of the active Nav Source annunciation, in the same color as the active Nav source.

Course/Desired Track Readout	This is a 3 digit readout of the selected course (with the same value as the Course Pointer), and is shown just below the active Nav source, with an identifying nomenclature in front of the readout. The readout and nomenclature are the same color as the active Nav source annunciation. Nomenclature: NAV Source: CRS VOR or LOC B/C LOC Back Course DTK FMS Desired Track HDG FMS (with heading leg active only the compatible FMS)
NAV/BRG Source Menu	NAV Source Menus available: NAV Source: BRG Source: FMS1 No. 1 Icon OFF FMS2 FMS1 VOR1 VOR1 VOR2 ADF1 LOC1 No. 2 Icon OFF LOC2 FMS2 No 1 BRG source and icon is magenta. No 2 BRG source and icon is cyan.
FMS Annunciations	If the active Nav source is FMS and no flight plan exists, “NO FLIGHT PLAN” is shown above the Aircraft Symbol when commanded by the FMS. If the active Nav source is FMS and the flight plan has reached Discontinuity, “DISCONTINUITY” is shown above the Aircraft Symbol when commanded by the FMS. NO FLIGHT PLAN and DISCONTINUITY are both shown in haloed white characters, and flash for 5 seconds when they first come into view, then stay steady.

D. PFD Nav to Nav Capture

(1) Controls

With PRE CRS LOC selected via the CDU, the Pre Nav source and frequency annunciation, Pre Course Pointer and associated deviation bar are displayed on the PFD. The Attitude Display Preselect lateral and vertical deviation pointers are enabled for display when the Pre Nav source is in view (Ref. Figure 5).

The FGP course knob will not control the Pre Course course pointer because the course is supplied by the FMS.

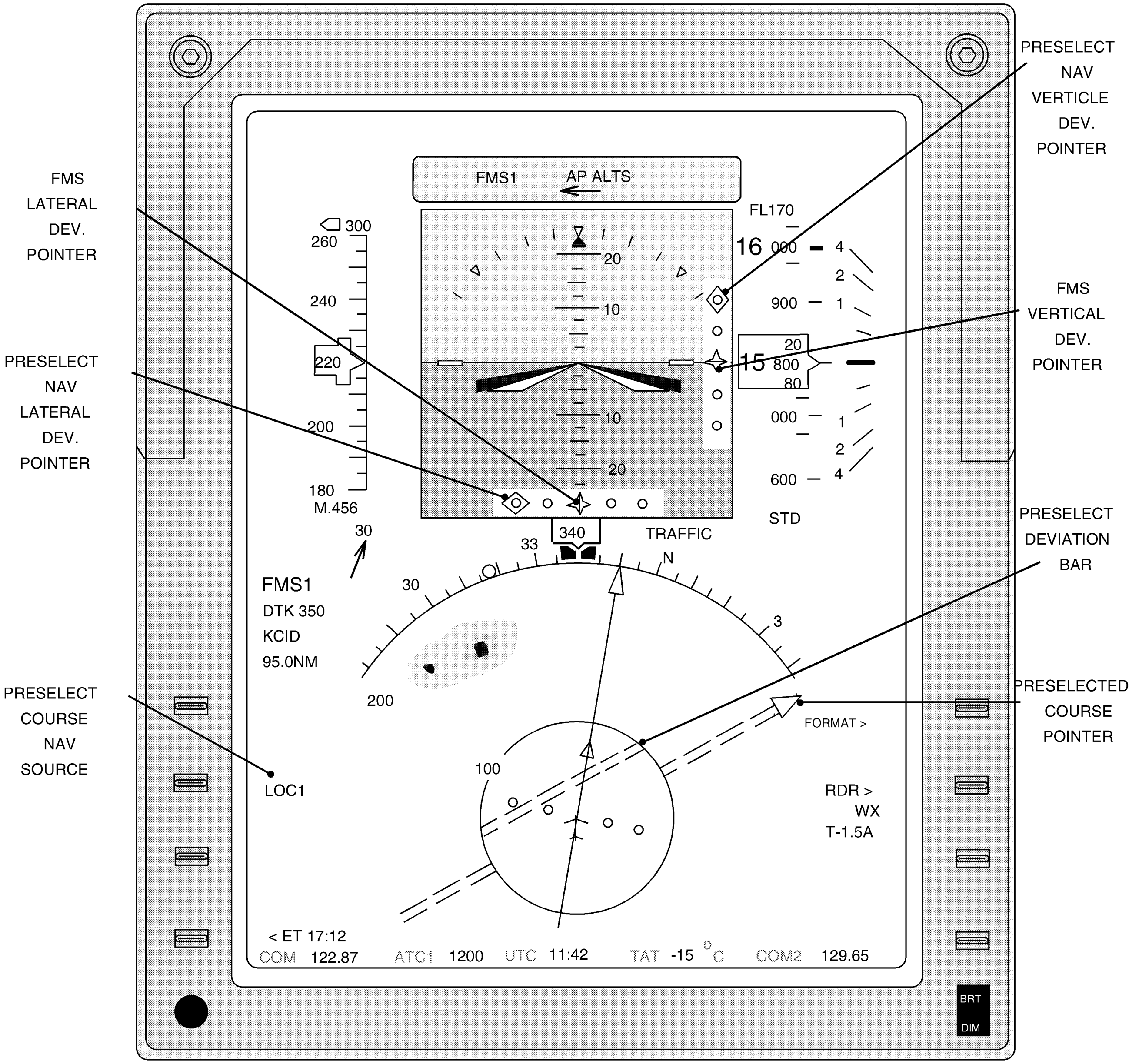

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Figure 5
Preselected Course Symbology

(2) Annunciations

The PFD shows preselected navigation data is almost the same as the active navigation data. The preselected (Pre) lateral Nav annunciations are the same as the equivalent active Nav source annunciations except as listed:

(a) Pre Course Pointer. The dashed double bar (unfilled) Pre Course Pointer arrow is cyan in color and its width is wider than the active Course Pointer. It is shown when the active Course Pointer, Pre Course Pointer, and both bearing pointers are in view. The Pre Course Pointer may be drawn under the active Course Pointer and can be seen if the two sets of data are coincident.

(b) Pre Lateral Dev Bar. This is the center part of the Pre Course Pointer, cyan in color, and its line width is the same width as the Pre Course Pointer. The preselect information is drawn under the active data and can be seen if the two sets of data are coincident. The Pre Lateral Dev bar uses the active Nav source dev scale.

(c) Pre Nav Source and Frequency. This is shown below the active course data, and its color is cyan. Only an on-side LOC source can be used for the preselected course.

(d) Attitude Display Pre Lateral Deviation. The diamond Dev pointer is cyan. The Attitude Display Pre Lateral Deviation uses the active Nav source Attitude Display Lateral Deviation scale.

(e) Attitude Display Pre Vertical Deviation. The diamond Dev pointer is cyan. The Attitude Display Pre Vertical Deviation uses the active Nav source Attitude Display Vertical Deviation Scale.

E. PFD Distance Display (Active Nav Source)

(1) Controls

No dedicated controls for the Distance Display exist.

(2) Annunciations

(a) Each DME's Channel 1 provides the station ID, Distance, and DME HOLD data associated with its onside VOR/LOC receiver.

(b) The FMS provides the Waypoint ID and Distance when FMS is the active Nav source:

i. Station/Waypoint Identification (ID): Up to 7 characters of Identification will be shown to the left of the compass lubber line. The color is the same as the active Nav source. ID is left justified.

ii. Distance: Up to 4 digits of distance is shown below the Identification field. The color is the same as the active Nav source. Range is left justified. The tenths of NM digit is smaller than the other distance digits and has a preceding decimal point. A NM nomenclature, the same color as the active Nav source, immediately follows the last Distance digit.

iii. DME Hold: If DME Hold is selected and the active Nav source is VOR or LOC, the distance readout will be followed with a cyan “H” instead of NM and the station ID will be removed.

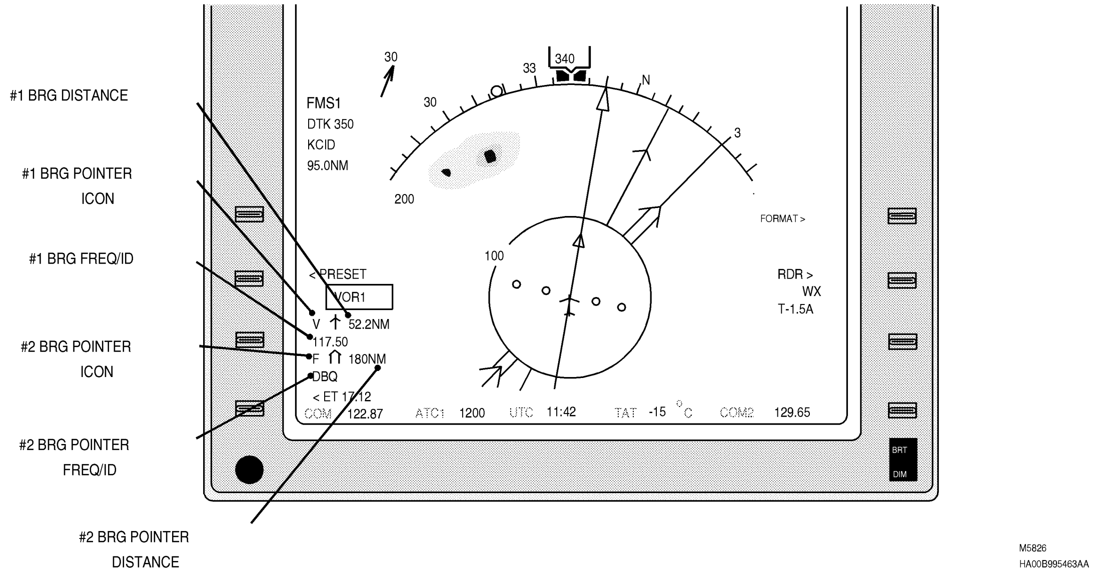

Figure 6
Bearing Pointer

F. PFD Bearing Pointer Displays

(1) Controls

(a) The BRG SOURCE Menu part of the NAV/BRG Menu selects the source (Ref. Figure 6).

(b) The pilot selects the bearing sources that follow from the BRG SOURCE Menu on the PFD using either the DCP MENU ADV or the LSK adjacent to the associated Bearing 1 or Bearing 2 shape and color coded icon: OFF, FMS, VOR, ADF.

(2) Annunciations

Bearing Pointer	The pointer for left-side sensors is a magenta single-bar arrow. The pointer for right-side sensors is a cyan double-bar arrow.
Bearing Source Icon	Bearing Source Bearing Icons are miniature representations of the bearing pointers that identify the actively selected bearing pointer. They are shown to the lower left of the compass display. The color follows the bearing pointers. Bearing Source Icons are accompanied by an identifying letter of F for FMS, V for VOR or A for ADF.
Bearing Distance	If available, valid Bearing Distance associated with the bearing source is shown to the right of the Bearing Icon. The color follows the Bearing Pointers convention. The up-to-4 digit, left justified, Bearing Distance display uses a decimal point to separate tenths, and an NM trailing nomenclature. The tenths and NM are smaller characters.
Bearing Ident	If available, the valid Bearing Ident is shown below the Bearing Source and Distance. For FMS the Ident is always the TO Waypoint identifier. For VOR the Ident is either the Station Ident or Frequency, dependent upon whether the DME decodes the Ident. The up-to-7 digit Bearing Ident is left justified.

VOR Bearing with True Heading	If a VOR Bearing is shown with True Heading selected, the bearing pointer is shown geometrically correct and a white T is shown after the bearing ident.

G. PFD ILS Vertical Deviation Display

(1) Controls

The GS display capability is a function of active Nav source selection. GS deviation is shown when LOC is the active Nav source.

(2) Annunciations

Vertical Dev Scale	This is a scale of 2 grey dots on either side of the grey center tickmark. It is shown as a “cut-out section” on the right-hand side of the attitude display. The background is black. The scale comes into view when LOC is selected as the active Nav source. However, it goes out of view if LOC is the active Nav Source and Back Course logic is true.
GS Deviation	The GS Deviation diamond-shaped pointer color follows the active Nav source color.

H. PFD VNAV Deviation Display

(1) Controls

FMS as the active Nav source is controlled by the active Nav source Menu. VNAV may be commanded for display via the FMS, only when the active Nav source is FMS. Regardless of FMS actions, the PFD will not allow display of VNAV unless FMS is the active Nav source, except during the Nav to Nav captures.

(2) Annunciations

Vertical Dev Scale	The Vertical Dev Scale is the same used for ILS Vertical Dev.
VNAV Deviation	The VNAV Deviation Pointer is a waypoint symbol pointer. The waypoint pointer is green when the VNAV Deviation is from the onside FMS and amber from the cross-side FMS.
VNAV Deviation Flag	The VNAV Deviation Pointer is removed. A red, boxed VNAV flag is shown above the Vertical Deviation scale. The annunciation and box flash for 5 seconds and then stay steady.

I. PFD Map Display

(1) Controls (Ref. Figure 7).

FORMAT	Push the FORMAT [R1] LSK on the PFD to select the Map Display.
NAV SOURCE Menu	The NAV SOURCE menu on the PFD selects the FMS which will be the Active NAV Source, and therefore, the MAP Source.
RDR	Push the RDR [R2] LSK to select the weather radar overlay display.
TFC	Push the TFC [R3] LSK to select the TCAS traffic overlay display.
DCP RANGE	The RANGE rotary switch on the DCP controls the RANGE.

(2) Annunciations

(a) Overlay Fault Field:

i. The MAP RANGE XXXNM is shown in haloed white at the bottom-center part of the display, if the FMS Map Range does not agree with the current range on the display. XXX represents the actual range the FMS Map is currently set to. There is a 10 second delay before showing this message to allow the FMS to synchronize to the display range. The MAP symbology is removed when MAP RANGE XXXNM is shown.

ii. MAP INCOMPLETE is shown in haloed white at the bottom-center part of the display if the FMS cannot supply all requested data, or if the PFD cannot show all data sent.

(b) Map Flag:

i. MAP is shown in haloed amber characters in the top-center part of the display if a fault is detected in any data required for the map display.

J. PFD FMS Message Window

(1) Controls

The FMS Message Window is controlled by the FMS (Ref. Figure 7).

(2) Annunciations

(a) The location of the FMS Message Window is above the active Nav Source annunciation.

(b) Lines are blank if no valid FMS Messages Line Words are received by the PFD.

(c) Valid FMS messages are shown only from the FMS that is the active Nav source.

(d) One or two lines of up to 8 characters can be shown.

(e) Size, color and flash rate are controlled by the FMS.

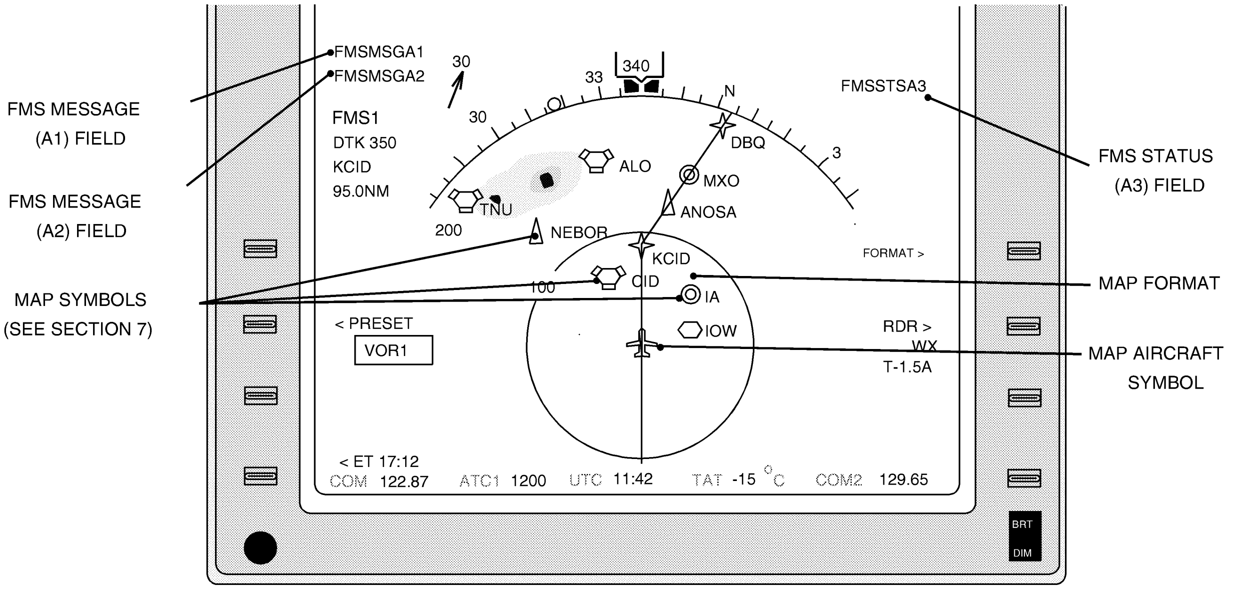

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Figure 7
PFD PPOS Map Display

K. PFD FMS Status Field

(1) Controls

The FMS Status Field is controlled by the FMS (Ref. Figure 7).

(2) Annunciations

(a) The location of the FMS Status annunciation is immediately above the Category 2 checklist message line, to the right of the Compass arc.

(b) The Line is only capable of being shown when an FMS Map is the current PFD mode.

(c) The Line is blank if no valid FMS NAV STATUS TEXT words are received.

(d) One line of up to 16 characters can be shown. The FMS controls each character's position, starting from the left most space in the FMS STATUS Field.

(e) The color, and whether the annunciations flash, are controlled by the FMS.

L. PFD Universal Time

(1) Controls

(a) The DCUs supply Time, and Date (which is not shown), from the following time and date sources, in the order listed:
GPS1, GPS2, MDC, FMS1, FMS2, DCU 1, DCU 2.

(b) The DCU acts as an arbiter of Time and Date, not as the ultimate source of Time and Date. The DCU provides Time and Date only as long as it is powered and has received a valid Time and Date input.

NOTE: DCUs must receive valid Time and Date from one of the sources listed above. A DCU will not accept Time or Date from another DCU.

(2) Annunciations

UTC Displays: UTC is shown on the bottom line, in the center, of the PFD. Full-time Bright Grey UTC legend is shown in front of the digital readout. The white digital readout has four digits, with a white colon separating the hours from the minutes.

M. MFD Ground Speed and Wind Display

(1) Controls

The source of the GS is the on-side FMS unless the cross-side FMS is selected as the active Nav source for the MFD's onside PFD.

(2) Annunciations

Ground Speed Display. This is a full-time Bright Grey GS Legend which is shown in front of the digital GS readout. The GS Readout is green, unless the source is the cross-side FMS, when it is amber.

N. MFD Heading Display, Format Selection, PPOS Map

(1) Controls

(a) The MFD always uses the same Heading Type, Selected Heading, and Range (when applicable) that is selected for the onside PFD. The PFD serves as the control for those items on the MFD.

(b) Push the FORMAT [R1] LSK to select the current MFD format. The complete list of MFD selectable Formats, in order, is: Rose, Arc, Present Position Map (PPOS Map), Plan Map, Maintenance and TCAS Only. Repeated pushes of the FORMAT [R1] LSK will cycle through the available Formats in the order shown.

(c) Push [L1] LSK to control the source of FMS Map and Text data between FMS1 and FMS2, and FMS1/FMS2 nomenclature appears adjacent to [L1] LSK together with a cyan left-facing caret, which points at [L1] LSK to show it can select between FMS1 and FMS2. The currently selected Map Source (i.e., FMS 1) is shown in larger letters, and the non-selected source (i.e., FMS 2) is shown in smaller white letters. If the active map source matches the NAV source, the active map source will be shown in a color matching the NAV source. If the active map source differs from the NAV source, the active map source will be shown in cyan. Push the Map Source LSK to select which FMS is the source of FMS Map data and of FMS Text data. The currently selected Map Source determines which FMS is the source of all PPOS Map, Plan Map and FMS Text data shown on the MFD.

(d) The area on the MFD above the normal navigation display (Rose, ARC, PPOS Map, Plan Map) is available for use for Text or Extended Map displays. This area is referred to as the Text Window. Refer to Figure 8 which shows the rows and columns that are available for medium characters for the Text Window. Character size, color and location are controlled by the originator of the Text (FMS or MDC). Rows 7 and 19 shall be left blank. The MFD controls the availability of the Text Window to potential user.

(e) The Present Position Map Format has two sub-modes which can be selected from the FMS CDU. These are the Extended PPOS Map and the FMS Text Window modes. These sub-modes are shown on the MFD only. The Extended PPOS Map sub-mode shows approximately 50% more forward range. The FMS Text Window sub-mode shows up to 11 lines of FMS Text data above the PPOS Map in rows 8 thru 18, inclusive. The text is supplied by the FMS in ASCII format.

(2) Annunciations

(a) There is no Heading shown in FMS Text Only or Maintenance formats. The Plan Map is a fixed “True North-up” (fixed zero degrees at the top of the display), and current Heading is not shown. All other MFD Formats show the same Heading data as described for the similar PFD formats, including Selected Heading, Heading Marks, Heading Readout, Heading Flag, Heading Source, Lubberline and Compass Reference Line. Refer to Section 4.1.4 for details.

(b) The Present Position Map is shown in the lower part of the MFD, around the Aircraft Symbol and below the Heading Arc (Ref. Figure 9).

(c) An FMS STATUS Field (FMS Annunciation A3) is shown well above the MFD's [R1] LSK.

(d) The annunciations that follow are only shown on the MFD:

i. A larger cyan Map Source annunciation is shown above [L1] LSK when FMS Maps are shown. The legend shows the Map Source selection FMS1 or FMS2.

ii. If Map Source is the same as the on-side active Nav Source, the Map Source annunciations follow the active Nav Source color code.

(e) The Map Source annunciation adjacent to [L1] LSK follows the active Nav Source color code if the Map Source and the active Nav Source are the same FMS.

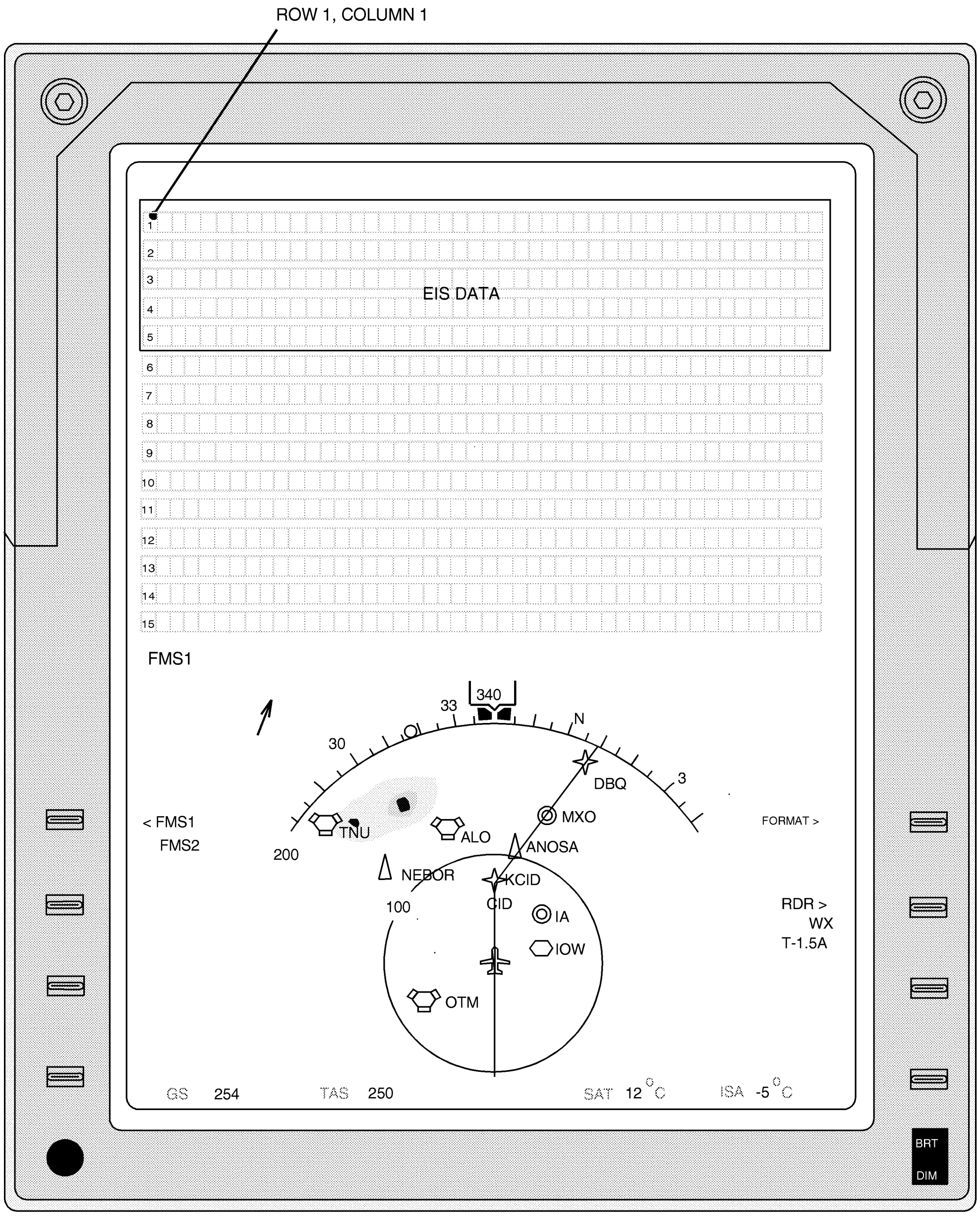

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Figure 8
MFD Text Window (FMS Map)

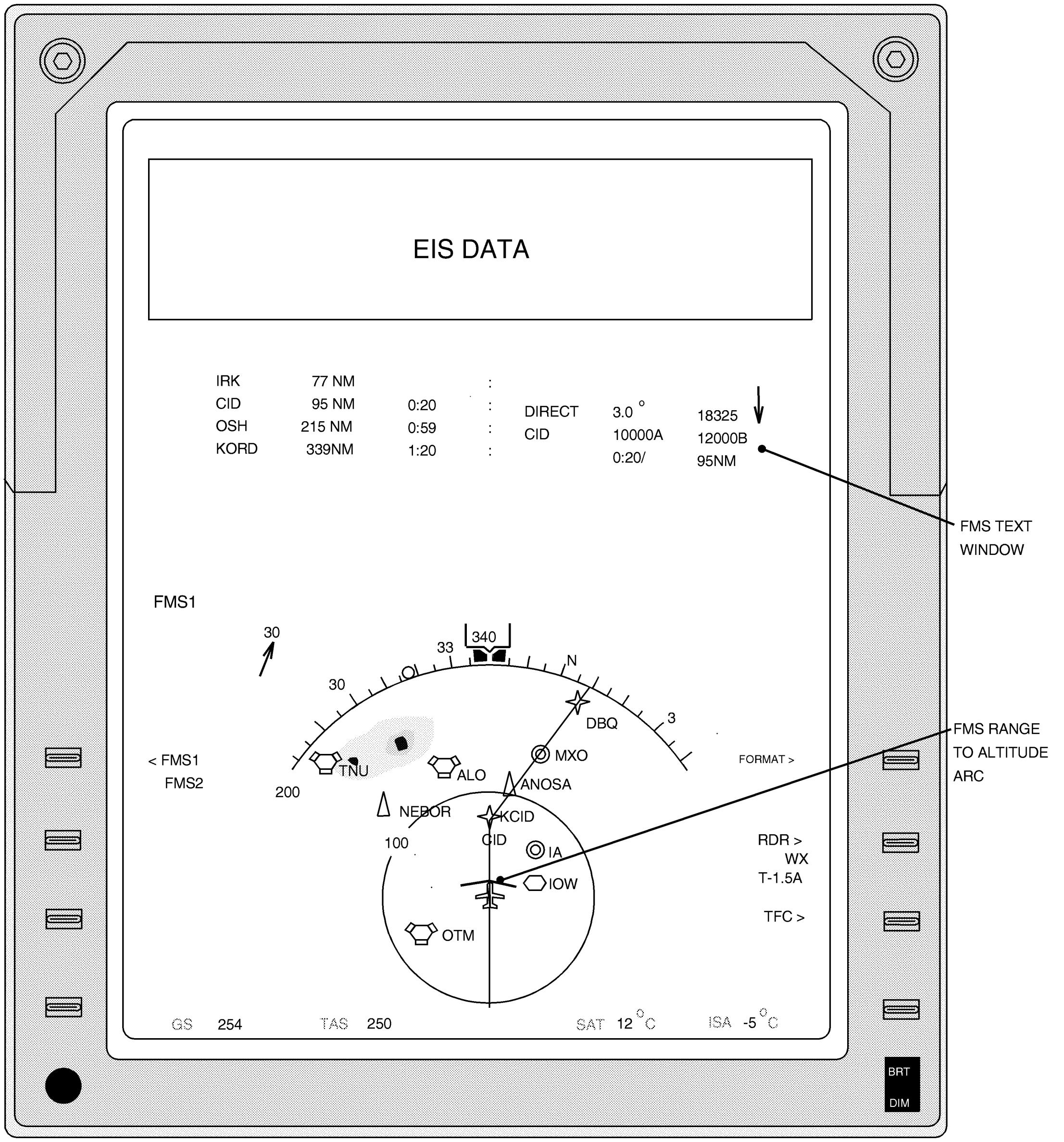

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Figure 9
PPOS MAP with Text Window

O. MFD Lateral Navigation Display

(1) Controls

(a) Except as detailed below, the MFD Lateral Navigation Display is the same as the active Nav source selected on the PFD.

(b) The source of the Time To Go (TTG) is the same source as that for the Distance display.

(2) Annunciations

The Nav Source data is shown above [L1] LSK in the order that follows:

- Active Nav Source identifier.
- Course/Desired Track Readout.
- Station/Waypoint Identification.
- Time To Go.
- Distance.

Except for the active Nav source data detailed in the list above, and with the exceptions detailed below, the MFD Lateral Navigation display has the same annunciations as the PFD.

- The TTG Display is two digits, a colon, and two more digits.
- No ADI Lateral or Vertical Deviations or their associated scales and Flags are shown.
- No active Nav Source Channel or Frequency is shown.
- The Nav Source Menu is only available on the PFD.

P. MFD Bearing Pointer Display

(1) Controls

The Bearing Pointers shown on the MFD are the same as the Bearing Pointers selected on the PFD.

(2) Annunciations

Except as detailed below, the Bearing Pointer annunciations are the same as detailed for the PFD.

- The Bearing source is shown to the left of the compass Rose, Arc, or Map.
- The Bearing Pointers are not shown in FMS Plan Map, FMS Text Only, TCAS Only, or Maintenance formats.
- The #1 Bearing Pointer Icon and associated data's position is moved up several rows to let the Checklist use the [R3] LSK.
- The Bearing Pointer Menu is only available on the PFD.

Q. MFD Plan Map Format

(1) Controls

(a) The center of the map is a latitude and longitude selected by the FMS. The map radius is selected with the RANGE rotary switch (Ref. Figure 10).

(b) The operation of the Map Source [L1] LSK on the MFD is the same as on the Present Position Map.

(c) The control of the MFD's Text Window by the MFD is the same as detailed for the PPOS Map.

(2) Annunciations

(a) The geographical position of the Aircraft Symbol on the map is controlled by the FMS. The The orientation of the Aircraft Symbol is controlled by the current AHS.

(b) The Aircraft Symbol is a swept-wing un-filled aircraft symbol (the same as the PPOS Map Aircraft Symbol).

R. MFD FMS Text Only Format

(1) Controls

(a) While any MFD Format is being shown, except Maintenance data, the pilot can push the FMS CDU's MFD DATA key to activate the FMS Text Only Format.

i. The MFD only responds to the on-side FMS when a request for FMS Text Only is made.

ii. If the onside PFD is showing a PPOS Map, the MFD ignores requests for FMS Text Only from any FMS, and a “NO TXT WHEN PFD MAP” annunciation is shown on the CDU.

iii. The previous MFD display will be cleared and the FMS text will replace it.

iv. Selection of FMS Text Only will be ignored by the MFD when Maintenance Format is active.

(b) To remove the FMS Text Only format, use the FMS CDU, or select the MFD FORMAT [R1] LSK, or the MFD TFC [R3] LSK.

i. If the FMS Text Only mode is ended by the CDU MFD DATA key, the last shown format before FMS Text Only will be shown.

ii. Push the FORMAT [R1] LSK to make the next Format available become active.

iii. Push the TFC [R3] LSK to select TFC, and the TCAS default display will be shown.

(2) Annunciations

(a) The alpha-numeric data that is shown is controlled by the FMS that is the FMS Map/Text source.

(b) “NO DATA AVAILABLE” is shown on the MFD in amber if FMS ASCII data is missing.

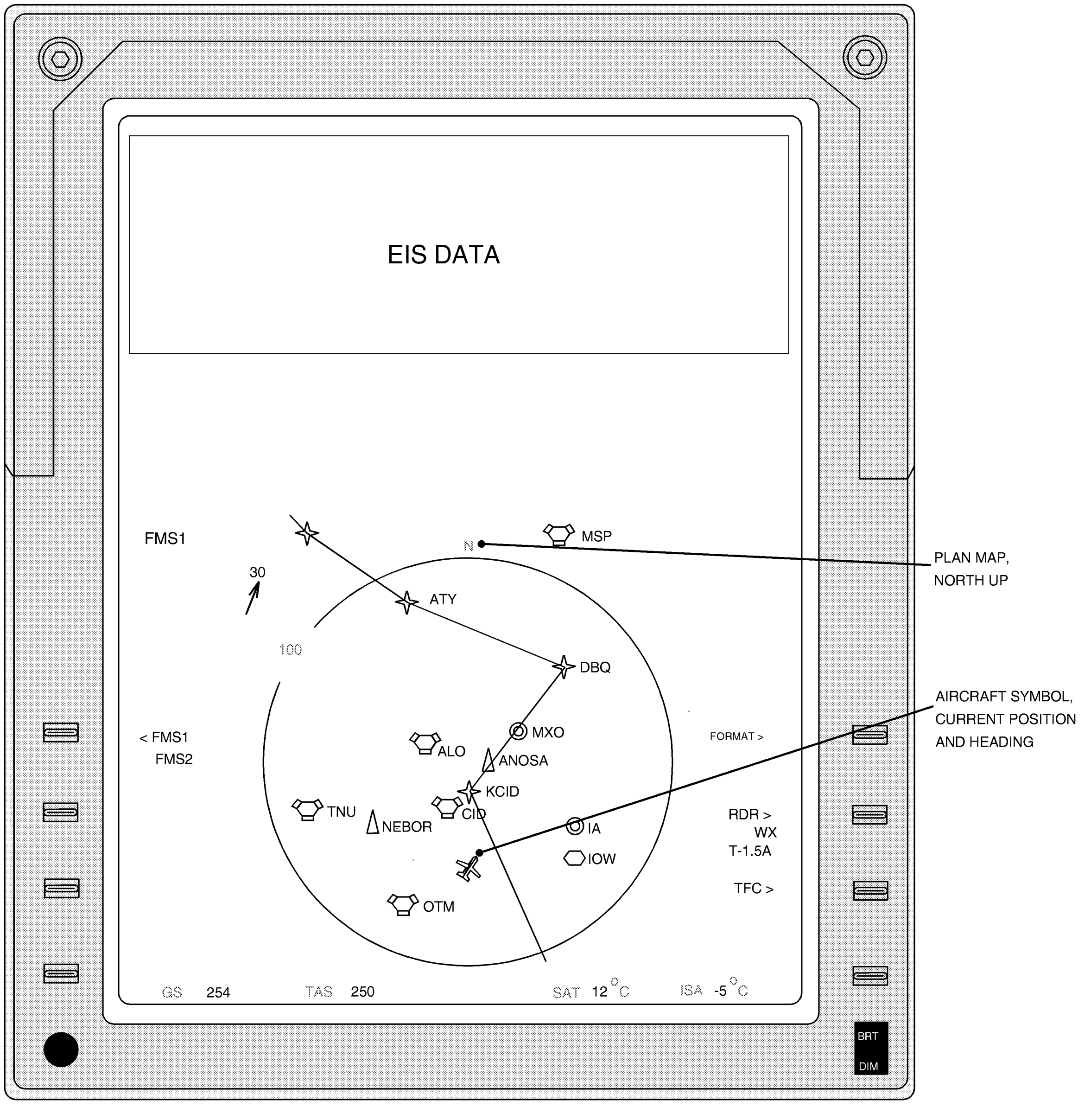

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Figure 10
MFD Plan Map Format

S. MAP Interface

(1) Controls

(a) The FMS Present Position Latitude and Longitude set the PPOS Map center.

(b) The FMS commands the display of currently tuned VOR/DME on the PPOS or Plan Map when VOR is the active Nav source.

(c) The Map Reference Point Latitude and Longitude set the Plan Map center.

(d) Vectors, Conics, and specific symbols are commanded by the FMS to show on the Map.

(2) Annunciations

(a) The Altitude Intercept Arc is a magenta icon which is put on the map, in an appropriate position along the current FMS track line. It shows the range to altitude intercept for the current VNAV leg. This icon is called the Altitude Intercept Arc.

(b) The Map Background Data includes map symbols that are shown, geometrically correct, on the map displays. Selection of the displayed background data is controlled from the FMS.

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
FLIGHT MANAGEMENT SYSTEM (FMS-6000) ADJUSTMENT/TEST

1. FMS-6000 SYSTEM

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the FMS-6000 system.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the FMS-6000 system.

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
FLIGHT MANAGEMENT COMPUTER
MAINTENANCE PRACTICES

1. INFORMATION

NOTE: When the Flight Management System (FMS) is removed or replaced, the software Pt.No. is to be verified per paragraph 2.B. (3) thru (5) below and logged in the Aircraft Maintenance Records before the airplane is returned to service.

NOTE: For FMS-6000 software update see Service Bulletin No. 34-3722.

NOTE: For Airplanes equipped with Collins Flight Management Computer, P/N 822-0868-069 (Collins FMS software Version 3.0.3.) see Service Bulletin No. 34-3836 for software upgrade.

Equipment/Materials	Part/Item No.
Performance Database	Diskette or CD with program Pt.No. 815-3198-XXX
V-Speeds Database	Diskette or CD with program Pt.No. 815-2850-XXX

2. FLIGHT MANAGEMENT COMPUTER (FMC-6000)

A. Removal/Installation

(1) Remove/install FMC-6000 card cage module (Ref. 31-40-15, 201).

B. Adjustment/Test

(1) From the INDEX page of the MCDU, access the FMS STATUS PAGE by pressing STATUS line select key.

(2) From the STATUS page of the MCDU, access the page 2/2 by pressing NEXT button.

(3) Make sure that the system program SCID 832-4117-073 is displayed on the FMS STATUS PAGE.

(4) Make sure that the Performance Database 815-3198-XXX is loaded in the FMS.

(5) Make sure that the V-Speeds Database 815-2850-XXX is loaded in the FMS.

(6) If Performance Database 815-3198-XXX is not loaded, install certified performance database. Refer to the Rockwell Collins Hawker 800XP Avionics Systems Manual, 523-0780103 Maintenance Section and do the Database Update Procedure to load a certified Performance Database Pt.No. 815-3198-XXX.

(7) If V-Speeds Database 815-2850-XXX is not loaded, install certified V-speed database. Refer to the Rockwell Collins Hawker 800XP Avionics Systems Manual, 523-0780103 Maintenance Section and do the Database Update Procedure to load a certified V-Speed Database Pt.No. 815-2850-XXX.

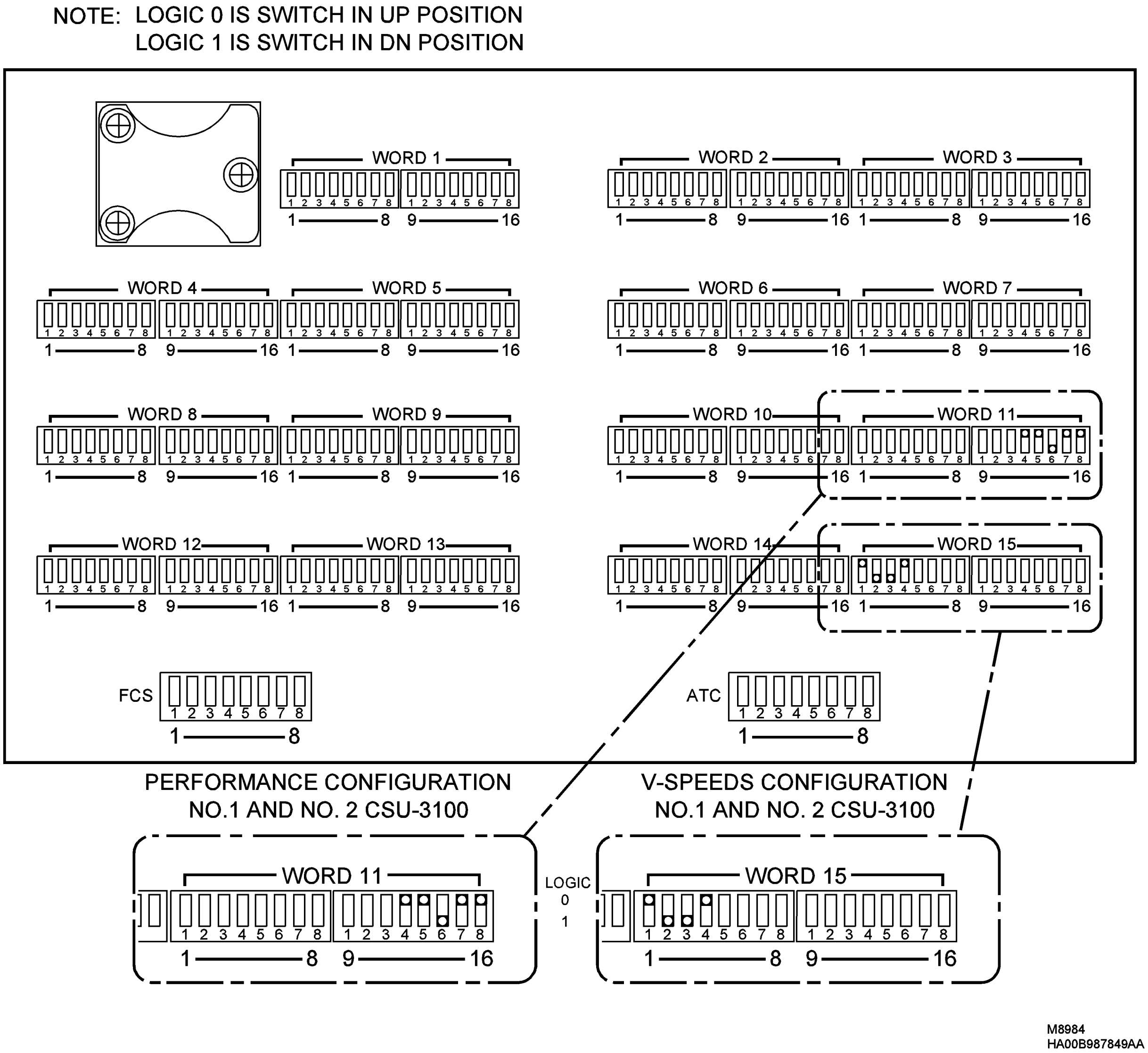
NOTE: LOGIC 0 IS SWITCH IN UP POSITION
LOGIC 1 IS SWITCH IN DN POSITION
WORD 1
WORD 2
WORD 3
WORD 4
WORD 5
WORD 6
WORD 7
WORD 8
WORD 9
WORD 10
WORD 11
WORD 12
WORD 13
WORD 14
WORD 15
FCS
ATC
PERFORMANCE CONFIGURATION NO.1 AND NO. 2 CSU-3100
V-SPEEDS CONFIGURATION NO.1 AND NO. 2 CSU-3100
LOGIC
0
1
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Figure 201
FMS Performance and V-Speed Database CSU settings.

(8) From the INDEX page of the MCDU, access the FMS STATUS PAGE by pressing STATUS line select key.

(9) Press NEXT button on MCDU to access page 2 of STATUS page.

(10) Make sure that the Performance Database 815-3198-XXX is loaded in the FMS.

(11) Make sure that the V-Speeds Database 815-2850-XXX is loaded in the FMS.

(12) Record the Performance and V-Speeds Database part numbers and FMS position (FMS 1 or 2) in aircraft maintenance records.

3. FMS DATABASE CSU SETTING

A. Adjustment/Test

(1) Refer to the Rockwell Collins Hawker 800XP Avionics Systems Manual, 523-0780103 Maintenance Section and do the CSU 1 and CSU 2 Programming Procedure to set strap setting for FMS Performance and V-Speed Database (Ref. Figure 201).

(2) Record word and strap settings in aircraft maintenance records.

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
DATA BASE UNIT - DBU-4100
DESCRIPTION AND OPERATION

1. DESCRIPTION

The Data Base Unit (DBU-4100) is a data loader containing a 3.5 inch high density disk drive. The unit uses two types of diskettes, high-density (2MB unformatted, 1.44 MB formatted) and double density 1 MB unformatted, 720 kB formatted). The DBU can read directories, read files, write files, rename files and delete files stored on diskette. To format the diskettes use any IBM compatible PC with MS-DOS 3.30 or later. The DBU is used primarily to load data base updates to the Flight Management Computer (FMC), to load maintenance tables to the Maintenance Diagnostic Computer (MDC), load checklist data to the MDC and to download maintenance data files from the MDC.

The data base memory stores waypoint information on VORs, DMEs, en route intersections, non-directional beacons, and airports, (including airport reference points, airport runway thresholds and airport terminal waypoints). In addition to way point data, the data base contains the desired airways, standard instrument departures (SIDs), standard terminal arrival route (STARs), and holding patterns. The data base is updated every 28 days. Do the update while the airplane is parked on the ground.

Two data bases may be loaded into the data base memory. In a dual FMS system, data base loading is independent; use the pilot or copilot CDU to update the left or right data base memory.

The diskette eject button is used to eject the 3.5 inch diskette from the disk drive.

The drive in-use indicator turns on when a file transfer operation is attempted. The drive in-use indicator turns on only when data is actually being read or written to the diskette.

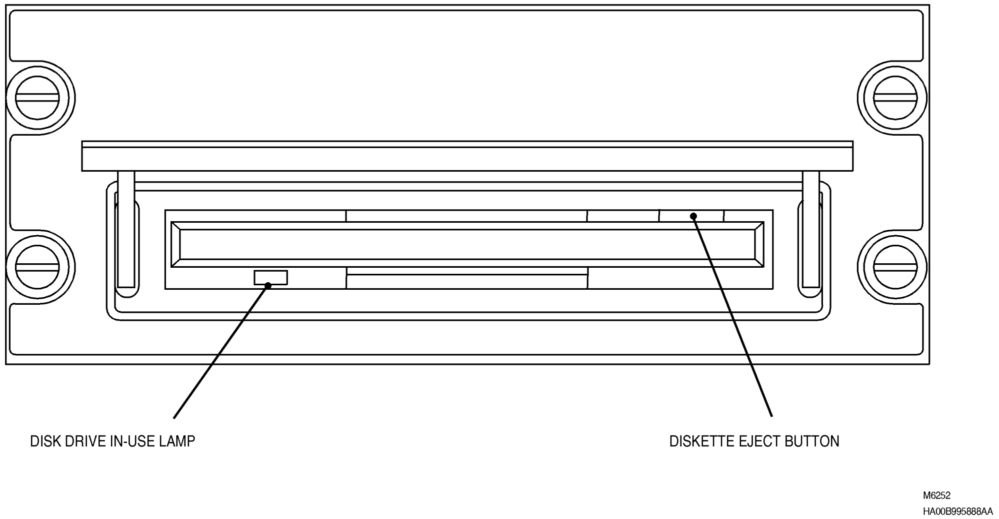


Figure 1
Data Base Unit

2. OPERATION

A. Procedure

(1) Update the system data base using the DBU-4100 and the CDU-6200 as follows:

(a) Push the IDX function key on the CDU to show the FMS INDEX page 1 of 2.

(b) Push the NEXT function key on the CDU to show the FMS INDEX page 2 of 2.

(c) Push the DB DISK OPS line select key on the CDU to show the DATA BASE DISK OPS page.

(d) Insert the data base diskette into the DBU.

(e) Push the READ DISK line select key. The CDU shows a diskette directory (normally a single-file name).

(f) Push the LOAD WORLD (for example) line select key to load the data base file into system memory.

NOTE: It will take several minutes to read this file. The CDU shows READ NAV DB IN PROGRESS message while the data base is loading.

(g) Wait until the CDU shows the READ NAV DB COMPLETE message for five seconds. The STATUS page automatically shows and the update is complete.

(h) Push the INDEX line select key to show the FMS INDEX page.

(i) Push the DBU eject button to remove the diskette.

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
DATA BASE UNIT
MAINTENANCE PRACTICES

1. DATA BASE UNIT

A. Removal

	MECH	INSP
(1) On panel DA, open and safety tag the circuit breakers that follow (Ref. 24-01-00, 201): **Panel** **Label** DA/D DATA LOADERS		
(2) Get access to the data base unit (DBU).		
(3) Loosen the four fastens and carefully move the DBU inboard to get access to the electrical connector.		
(4) Disconnect the electrical plug from the DBU socket and remove the DBU.		
(5) Install protective caps to the plug and socket.		

B. Installation

	MECH	INSP
(1) Remove the protective caps from the plug and the DBU socket.		
(2) Put the DBU in position and connect the plug and socket.		
(3) Push the DBU into the correct position in the rack and tighten the four fasteners.		
(4) Remove the safety tags and close the circuit breaker opened in paragraph 1.A.(1).		

C. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the Data Base unit.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the Data Base unit.

D. Close Up

	MECH	**INSP**
(1) Make sure the work area is clean and clear of tools and other equipment.		

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
DATA BASE UNIT - DBU-5000
DESCRIPTION AND OPERATION

1. DESCRIPTION

The Data Base Unit (DBU-5000) can be mounted in the airplane avionics bay or in the cockpit. The DBU-5000 is used to load navigation and performance databases as well as load pilot-defined routes and waypoints from USB storage devices. The DBU-5000 is also used to download information from LRU that are capable, for example the MDC error logs and FMS waypoints and routes.

The DBU-5000 provides all the necessary capability for the pilot to load data from USB storage devices to the airplane LRUs. The DBU-5000 comes equipped with two USB ports, two tri-color LEDs (one for each port) and a protective door, which may be a sliding door or a flip top door.

2. OPERATION

A. Procedure

(1) Update the system data base using the DBU-5000 and the CDU-6200 as follows:

(a) Push the IDX function key on the CDU to show the FMS INDEX page 1 of 2.

(b) Push the NEXT function key on the CDU to show the FMS INDEX page 2 of 2.

(c) Push the DB DISK OPS line select key on the CDU to show the DATA BASE DISK OPS page.

(d) Insert the USB storage device with the database into the DBU USB port.

(e) Push the READ DISK line select key.

(f) Push the line select key on the CDU for the database that is to be loaded.

NOTE: It will take several minutes to read this file. The CDU shows READ NAV DB IN PROGRESS message while the data base is loading.

(g) Wait until the CDU shows the READ NAV DB COMPLETE message for five seconds. The STATUS page automatically shows and the update is complete.

(h) Push the INDEX line select key to show the FMS INDEX page.

(i) Remove the USB storage device from the DBU.

CAUTION: *Do not remove or insert the storage device when the LED is blinking yellow. This may corrupt the files on the storage device or start the DBU initialization process.*

CAUTION: *Flight Management Computer (FMC) database loading of new, repaired or updated FMCs requires a specific load order of: Performance Database, Vspeed Database and Navigational Database. This is due to dynamic memory allocation of the computer’s memory during the loading process. See the applicable Service Letter (523-0808873) for more details.*

TOTAL TEMPERATURE SENSOR (ROSEMOUNT 102ER-1EC) - DESCRIPTION AND OPERATION

1. Description

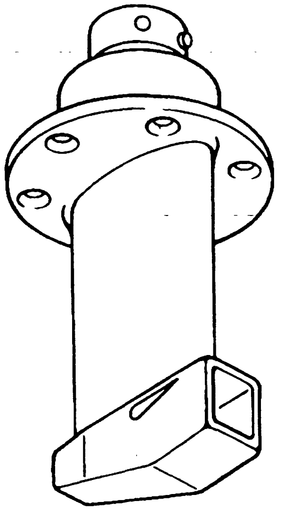
The triple-element total temperature sensor *(Figure 1)* is used for accurate temperature measurement of the air mass through which the airplane flies.

Three platinum, resistance-type elements each of 500 ohms resistance at 0 deg C are installed, these provide outputs to the air data computer and to the flight data recorder (when installed).

A de-icing heater element operates from the airplanes 28V dc supplies, it is installed in the air scoop and strut to make sure of satisfactory operation in all icing conditions. The heater has an in-flight power rating of approximately 270 watts and is automatically connected to the airplane busbars through the weight-on-wheels microswitch. Still air power rating is approximately 140 watts

2. Operation

The air enters the intake scoop, and, after being diverted through 90 degrees, flows over the sensing elements and its temperature is measured. The outputs from the sensing elements are used in computations to derive True Airspeed (TAS), Static Air Temperature (SAT) and Total Air Temperature (TAT).



Total temperature sensor
Figure 1

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
TOTAL TEMPERATURE SENSOR (ROSEMOUNT 102ER-1EC)
MAINTENANCE PRACTICES

1. INFORMATION

Equipment/Material	Part/Item No.
Polysulphide Sealant	314 (Ref. AMM 125/H-20, 20-95-301)
Cleaner, solvent	201 (Ref. AMM 125/H-20, 20-95-201)
Jointing compound	307 (Ref. AMM 125/H-20, 20-95-301)
Aluminum wool	Local supply

2. TOTAL TEMPERATURE SENSOR

A. Removal

	MECH	INSP
(1) Open, safety and tag the relevant circuit breakers that follow (Ref. 24-01-00, 201): **Panel** — **Label** DA/D — TAS PROBE DA/A — PRI (ADC 1) DA/A — SEC (ADC 1) DA/A — PRI (ADC 2) DA/A — SEC (ADC 2)		
(2) Locate the total temperature sensor on the right front wing-to-fuselage fairing. Record the sensor orientation.		
(3) Remove and keep the screws which attach the total temperature sensor, and remove the sensor to the extent permitted by the connecting cables.		
(4) Disconnect the electrical connector and install a protective cap and cover.		

B. Installation

	MECH	INSP
(1) Make sure the bonding areas of the securing screws, sensor and fairing are free from deterioration and contamination.		
(2) Thoroughly clean all mating surfaces with cleaner (Item 201) and aluminum wool. Apply a thin coating of jointing compound (Item 307) to both mating surfaces.		

	MECH	INSP
(3) Connect the cable connector to the sensor after removing the protective cap and cover.		
(4) Carefully position the sensor on the fairing as recorded in paragraph 2.A.(2) and attach with the screws.		
(5) Seal the periphery of the sensor base and the top of the securing screws with polysulphide sealant (Item 314) (Ref. AMM 125/H-20, 20-10-1002, 201).		
(6) Remove the safety clips and tags and close the circuit breakers opened in paragraph 2.A.(1).		
(7) Do an operational test of the total temperature sensor.		

C. Operational Test

CAUTION: *Do not operate the weight-on-wheels microswitch for longer than 15 seconds to avoid over-heating of the total temperature sensor.*

ACTION		RESULT
(1) Energize the airplane busbars (Ref. 24-01-00, 201)		–
(2) Turn on the left pitot heat switch		–
(3) On right hand main landing gear, operate the weight-on-wheels microswitch to the flight position		The total temperature sensor warms up.
(4) Release weight-on-wheels microswitch and turn off left pitot heat.		–
(5) Initialize the air data system (Ref. 34-10-19, 501).		–
(6) On PFD and MFD, examine the temperature.		The PFD and MFD show ambient air temperature.
(7) De-energize the airplane busbars (Ref. 24-01-00, 201).		–

D. Close Up

	MECH	INSP
(1) Make sure the work area is clean and clear of tools and other equipment.		

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
ELECTRONIC FLIGHT INSTRUMENT SYSTEM
DESCRIPTION AND OPERATION

1. DESCRIPTION

A. Information

The Electronic Flight Instrument System (EFIS) collects, concentrates, and shows airplane data to the flight crew.

The electronic flight instrument system has the units that follow:

- Four 8 in. x 10 in. Adaptive Flight Displays (AFD).
- Two Display Control Panels (DCP).

For Airplanes prior to Serial No.258744 without Kits AAC-0409 and AAC-0410:

The four AFDs are installed laterally in the instrument panel (Ref. Figure 1). The AFDs are the same (AFD-3010), and are configured, by mount strapping, to operate as a Primary Flight Display (PFD) or a Multifunction Display (MFD). For each pilot, in usual operation, the outboard display is configured as a PFD and the inboard display is configured as an MFD.

The DCPs (DCP-3020), together with the bezel mounted switches on the AFDs, provide the primary pilot interface to control the displays.

For Airplanes Serial No.258744 and After or airplanes with Kits AAC-0409 and AAC-0410:

The four AFDs are installed laterally in the instrument panel (Ref. Figure 1). The AFDs are the either AFD-3010 or AFD-3010E, and operate as a Primary Flight Display, (PFD) AFD-3010 or a Multifunction Display (MFD) AFD-3010E. For each pilot, in usual operation, the outboard display is a PFD and the inboard display is a MFD.

The DCPs (DCP-3040), together with the bezel mounted switches on the AFDs, provide the primary pilot interface to control the displays.

B. Primary Flight Display

The PDF can show the parameters that follow (Ref. Figure 2):

- Altitude
- Airspeed
- Vertical Speed
- Height
- Attitude
- Lateral Acceleration
- Flight Guidance
- Lateral Deviation
- Vertical Deviation
- TCAS II Traffic Symbology and Resolution Advisory

- Distance
- Rose and ARC
- MAP Symbology
- Radar Symbology
- Bearing
- EGPWS Symbology
- Elapsed Time Display
- TAT (Total Air Temperature)
- Time of Day Display
- Engine Parameters (when reversionary display in enabled)
- Fuel Quantity (when reversionary display is enabled)
- Ventral Tank Annunciation (when reversionary display is enabled)

C. Multifunction Display

The MFD can show the parameters that follow (Ref. Figure 3):

- Engine Parameters
- Fuel Quantity
- Ventral Tank Annunication
- MAP Display
- Radar Symbology
- Temperature
- True Airspeed (TAS)
- TCAS II Traffic Symbology
- EGPWS Symbology
- Checklist Data
- Maintenance Data
- Electronic Charts
- Enhanced Maps
- Weather Display

D. Functions

In addition to the processing necessary to show the parameters in the previous section, the AFDs can implement the calculations/algorithms/logic necessary for the functions that follow:

- Airspeed Trend Vector
- Low Airspeed Awareness
- Overspeed Alert

- Altitude Alerts
- Display/Blanking Logic for V Speeds
- RA/baro Minimums Display/Alert Logic
- Barometric Altitude

E. PFD/MFD Display Reversion

(1) The PFD/MFD reversion annunciator/switches are mounted on the bottom of the left and right instrument panels.

(2) PFD Operation with Loss of the MFD.

If the MFD fails, the PFD operation is not stopped. The engine or fuel data is shown on the PFD in reversion. Engine data is shown on the left PFD and usually fuel is shown on the right PFD in reversion. These additional PFD functions are enabled when you operate the MFD to PFD Reversion switch.

(3) MFD Reversion to PFD Operation.

If the PFD fails, the MFD can be reconfigured to function as a PFD. When the Reversion switch is activated, the PFD turns off and the MFD becomes a PFD. The MFD operation in PFD reversion is the same as the PFD operation with loss of the MFD.

F. PFD/MFD Dimming

The AFD design provides for an External Dimming control signal interface in addition to a Local Dimming Trim control.

G. Conventions

(1) PFD and MFD Line Select Key numbering:

There are eight Line Select Keys (LSK) on each PFD and MFD - four at the bottom left and four at the bottom right of each display. The numbering of the LSKs is specified as:
Keys on the left side of the display are referred to as [L1] LSK (top) thru [L4] LSK (bottom).
Keys on the right side of the display are referred to as [R1] LSK (top) thru [R4] LSK (bottom).

LSKs which are currently active have a side-facing caret (< or >) which points from the related legend to the LSK. Some menus may put legends adjacent to various LSKs when the LSKs have no function. The absence of the side-facing caret shows that the LSK has no function.

(2) The EFIS color convention for the PFD and MFD is as follows:

- Warnings, flight envelope and system limits are red.
- Cautions and abnormal source annunciations are amber.
- Fixed legends, scales and flight plan data are white.
- Navigation data is usually green, but is amber if cross-side source is selected.
- Directly-pilot-entered values are cyan.
- Machine-supplied values (which may result from pilot-entered values not on the EFIS) are magenta.

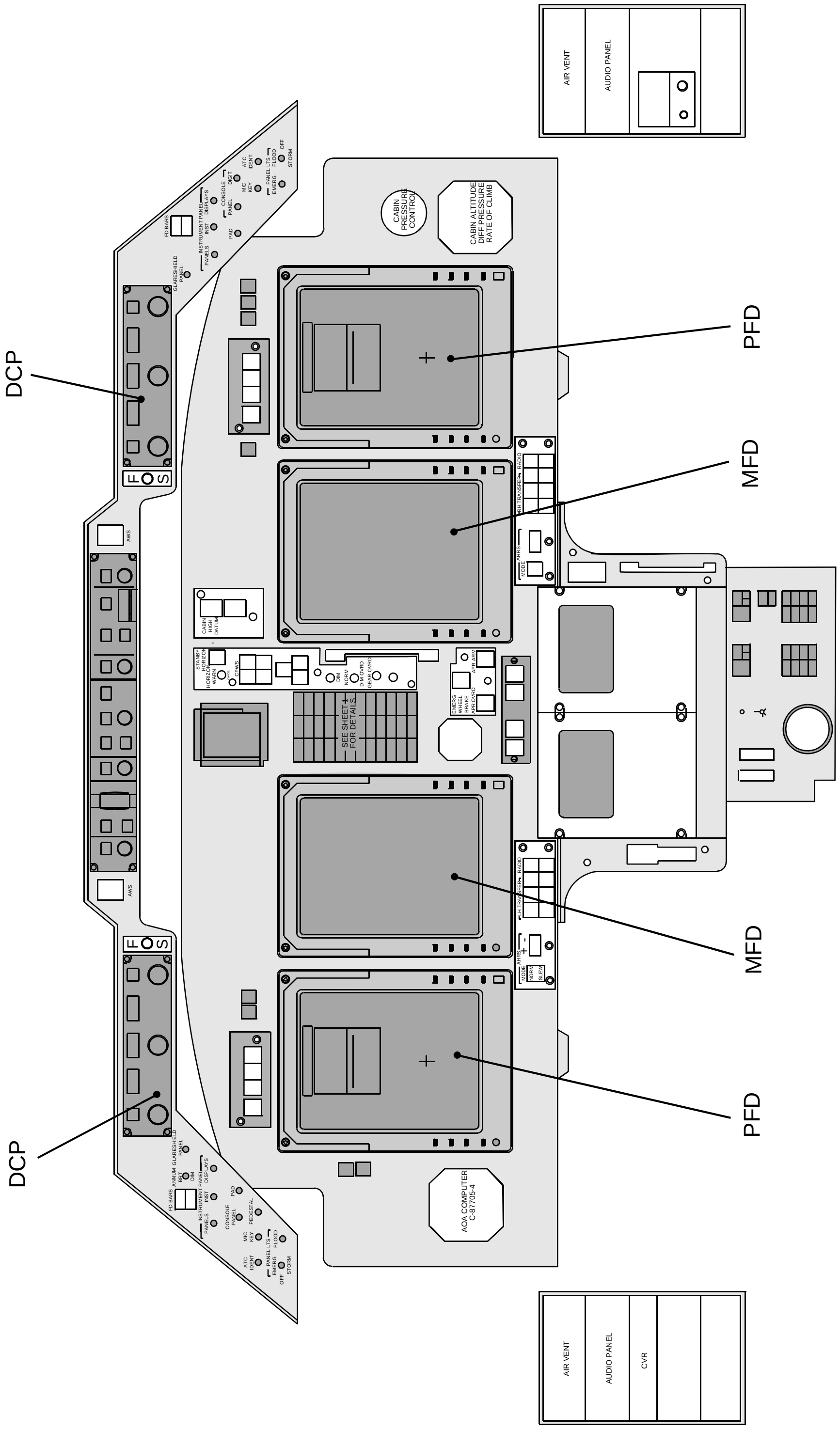


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Figure 1
AFD Display Location

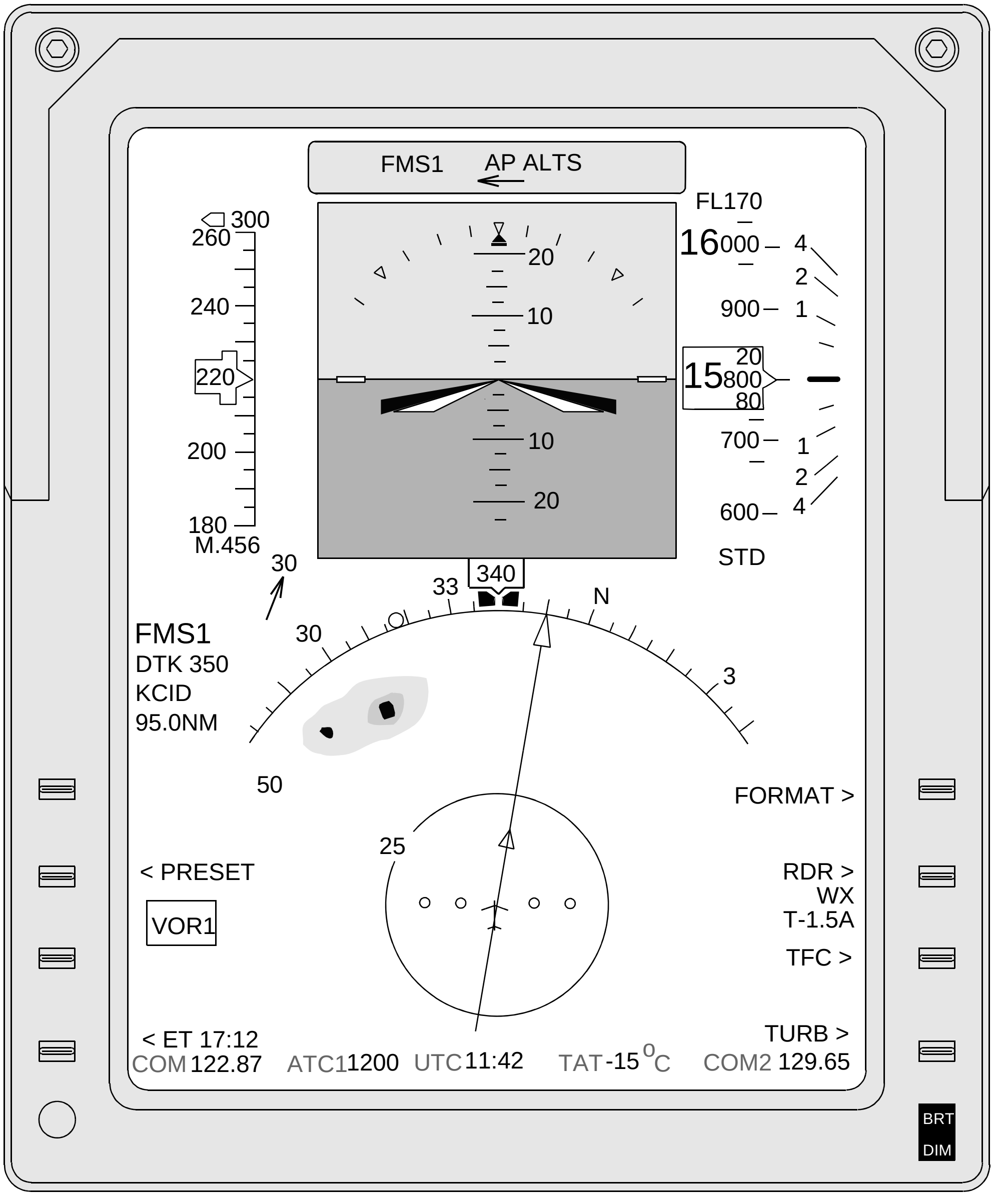

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Figure 2
PFD Display Format

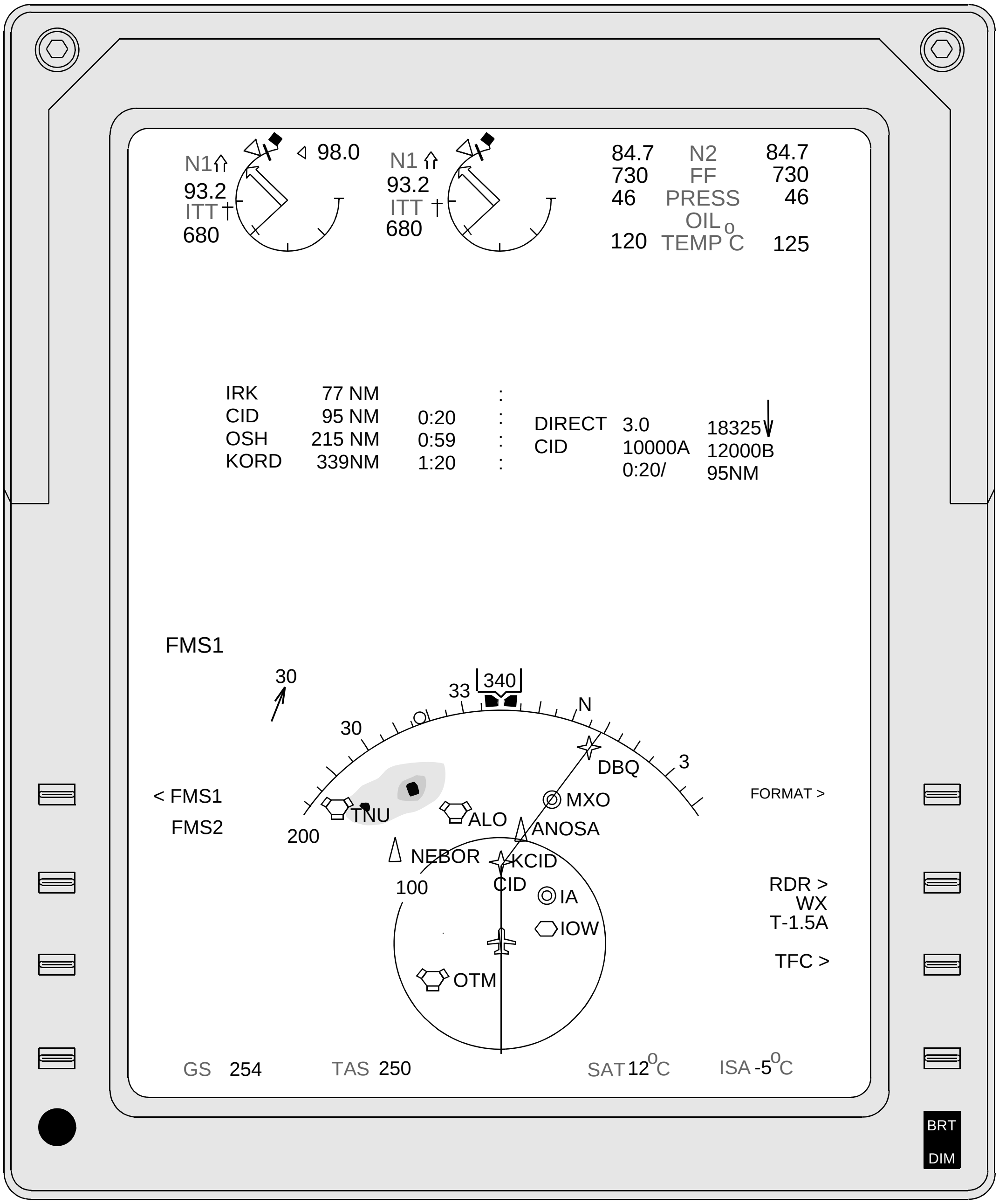

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Figure 3
MFD Display Format

(3) The font sizes that follow are used for the PFD and MFD:

Very Small (VSC)	…	0.09in. (not currently used)
Small (SC)	…	0.106 in.
Medium (MC)	…	0.123 in.
Large (LC)	…	0.162 in.
Very Large (VLC)	…	0.197 in.
Line Width	…	0.0177 in.
Wide Digits	…	The width of a Wide Digit is 1.2 times the width of normal characters. Height remains the same.
Thin Boxes	…	The line width of a Thin Box is 0.75 times the line width of a normal box.

(4) The useable display area for the AFD is:

- 7.98 in. high
- 5.98 in. wide

(5) The definitions that follow are used throughout this procedure:

- “Halo” - means there is a thin black line (halo) around the symbol or character. A halo is used to let characters and/or symbols be clearly seen when they are shown against a solid background color (such as the sky/ground).
- “Windowed” - means there is a colored background to the symbol, character or character field.

(6) Unless otherwise stated all red and amber flags and alerts drawn on the attitude display are shadowed.

(7) Refer to Figure 4 for PFD Space Utilization and Figure 5 for MFD Space Utilization.

2. OPERATION

A. Adaptive Flight Displays

Control of the basic display formats is via the eight bezel-mounted Line Select Keys (LSK) on each AFD. Control of the radar, navigation sources, bearing pointers, speed and altitude references is via the Display Control Panel (DCP) and the AFD LSKs. Controls for the Flight Guidance System (FGS) reference speed and altitude reference are on the Flight Guidance Panel (FGP).

When a DCP function switch is pushed, the PFD shows the appropriate menu. While the menu is shown, the PFD push button switches are active. The menu is automatically blanked after 10 seconds of no switch activity. Selection of a different DCP function key before the previously selected menu is blanked, causes the previous menu to be replaced with the newly selected menu. The DCP MENU ADV rotary switch selects menu items and sets boxed values for the selected menu item. Push the DCP MENU SET rotary switch to make the “set box” to flash or to activate the boxed value. Only the DCP controls are necessary to enable the AFD parameters that follow:

- PFD Navigation Source
- Weather Radar Gain

- V Speeds
- Approach Minimums
- N1 Reference

In addition to the above, the DCP provides direct control of the AFD parameters that follow:

- Baro Set
- Standard Pressure
- hPa/in. pressure reference
- Ground Clutter Suppression
- Radar Tilt Angle
- PFD and MFD map range

B. PFD/MFD Display Reversion

The reversionary switches are installed on the bottom of the left and right instrument panels (Figure 6).

PFD Operation with loss of the MFD.

(1) Controls

(a) Selection of “PFD” on the PFD/MFD Reversion switch enables the display of additional PFD parameters and automatically de-energizes the MFD.

(b) The optional PPOS Map display is enabled.

(c) TCAS data display is enabled.

(d) SAT and ISA are shown.

(2) Annuciations

(a) The SAT and ISA legends are grey and the associated readouts are white. They are shown above the COM 2 legend.

MFD Reversion to PFD Operation.

(3) Controls

(a) Selection of “MFD” on the PFD/MFD Reversion switch causes the MFD to become a PFD, and enables the display of additional PFD parameters, and automatically de-energizes the PFD.

(4) Annunciations

(a) The SAT and ISA legends are grey and the associated readouts are white. They are shown above the COM 2 legend.

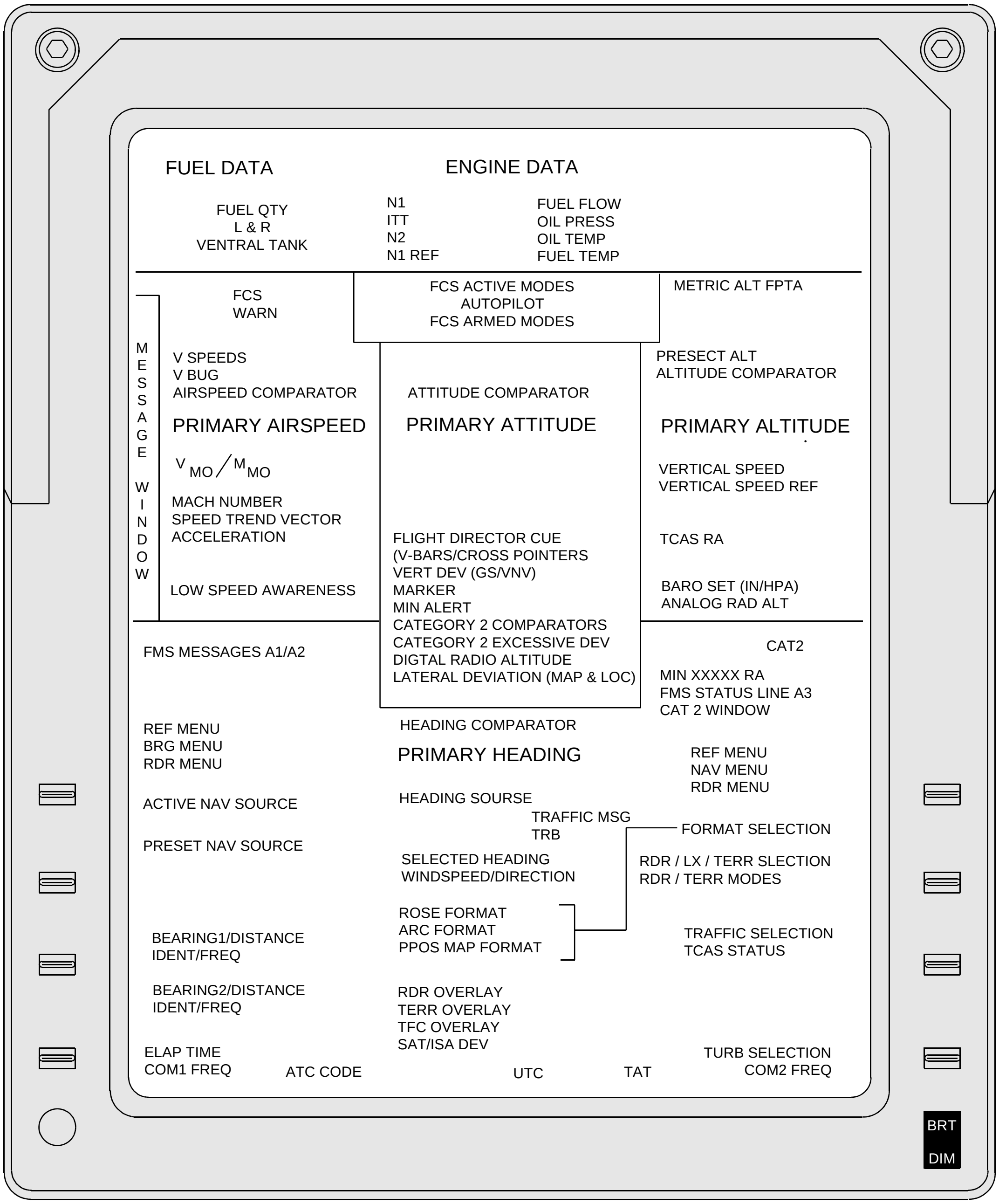

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Figure 4
PFD Space Utilization

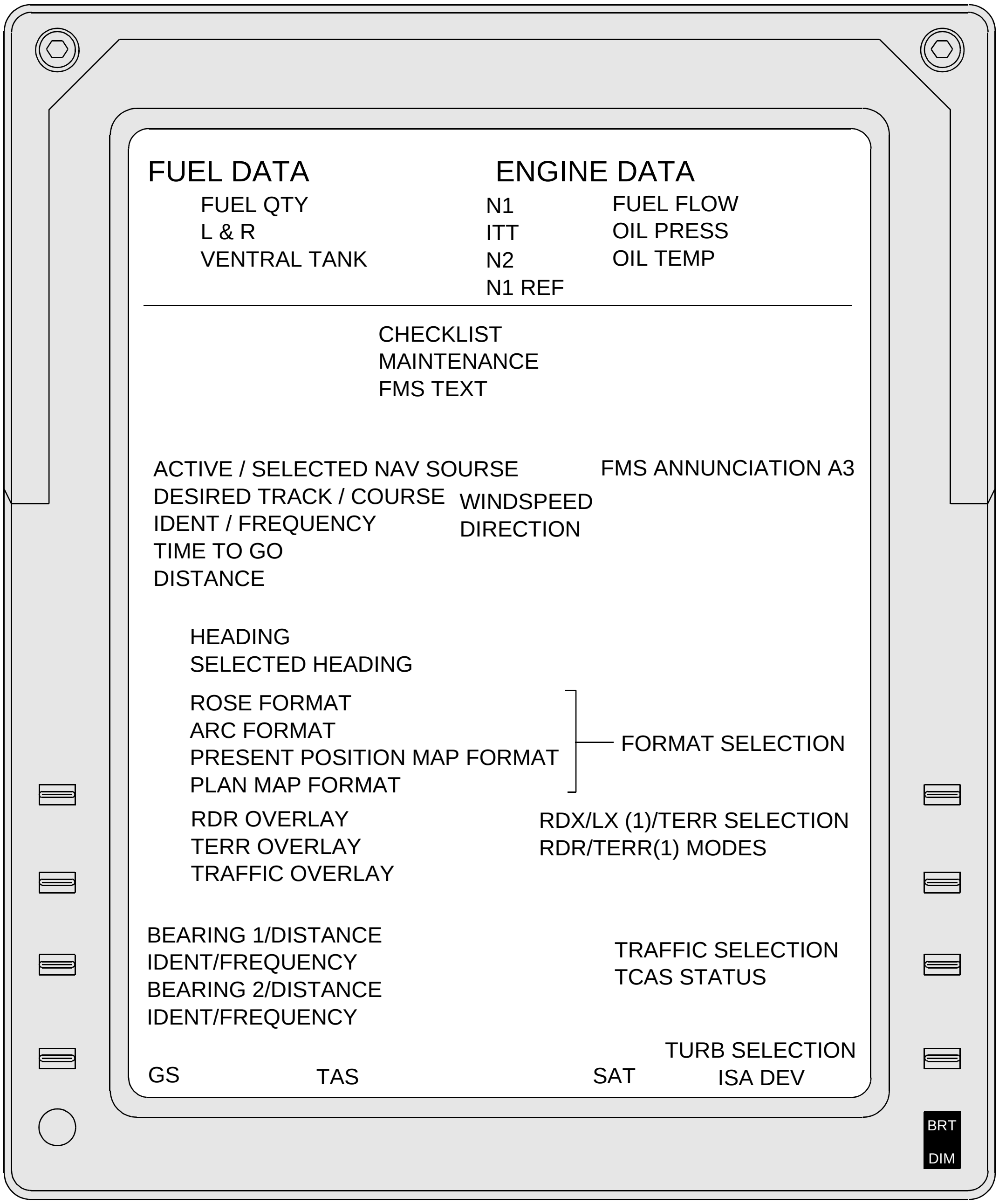

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Figure 5
MFD Space Utilization

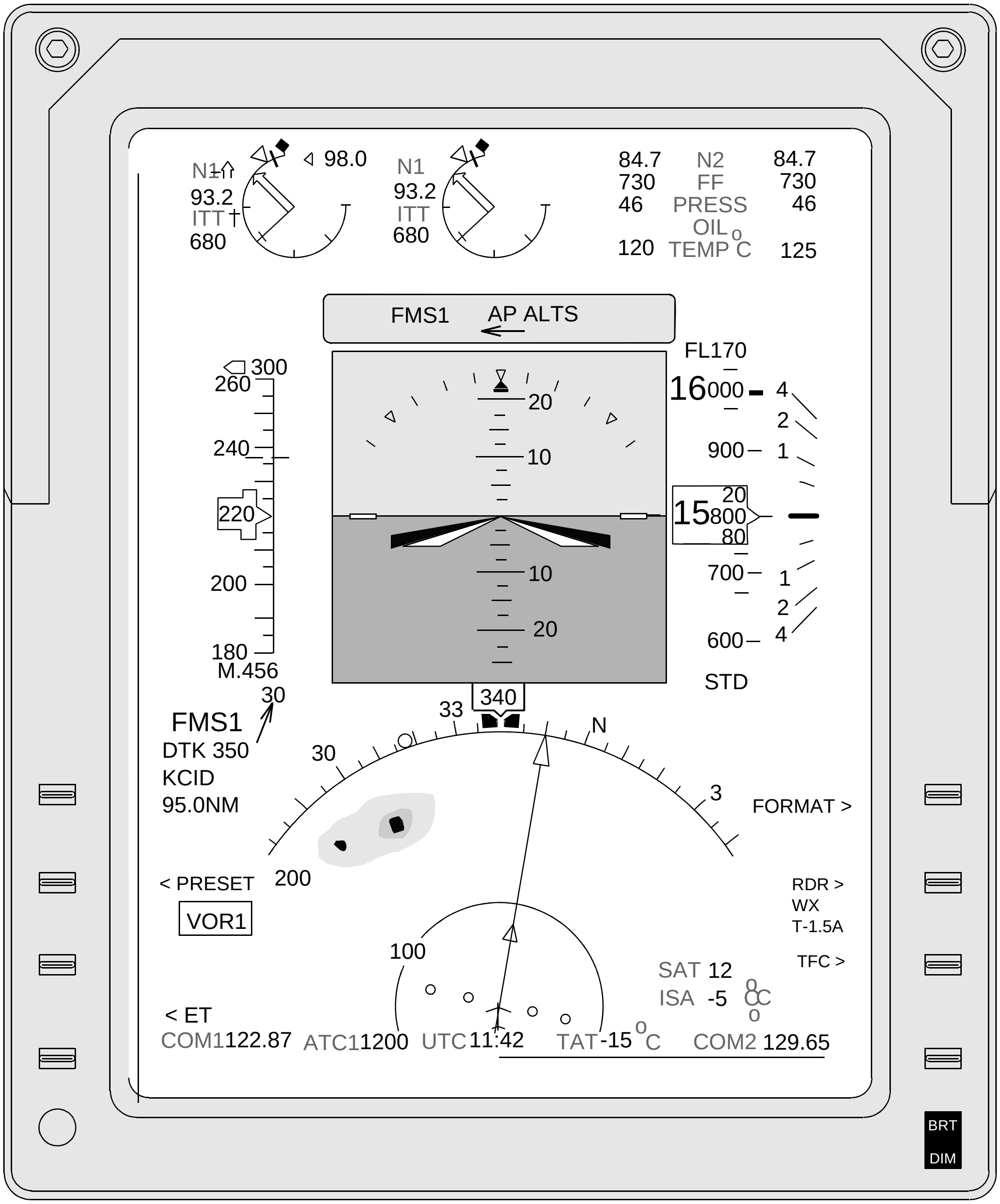

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Figure 6
LH PFD Display with Failed LH MFD

C. PFD/MFD Dimming

(1) There is an External Dimming control for cockpit zone or remote dimming operation in the cockpit.

(2) There is a Local Dimming Trim control (referred to as the Trimmer) on each AFD. This control works together with the External Dimming control, and ensures that the pilot can keep sufficient dimming control in the event of a failure of the External Dimming control.

(3) The External Dimming control is used to make normal brightness level adjustments. The Local Dimming Trim control, in the lower right corner of the AFD, is used to set the nominal brightness. The Trimmer also can be used to set the brightness if the External Dimming control has failed.

D. Display Control Panel (Airplanes prior to Serial No. 258744 without Kits AAC-0409 and AAC-0410)

The DCP has the rotary switches that follow (Ref. Figure 7, Sheet 1):

(1) BARO

- Barometric pressure correction setting control.
- Center push button selects Standard Baro Correction.

(2) MENU ADV

- Advances to next menu selection and sets value of selected parameter on AFD.
- Center push button sets and activates menu item.

(3) TILT/RANGE

- Two Stage concentric knob.
- Outer (lower) knob controls radar tilt.
- Inner (upper) knob controls radar range.
- Center push button AUTOTILT selects and activates weather radar Autotilt.

The DCP has the push button switches that follow:

(4) ENGINE

- Controls secondary engine display.

(5) REFS

- Selects references menu.

(6) NAV/BRG

- Selects navigation source/bearing pointer menu.

(7) RADAR

- Selects radar menu.

(8) GCS

- Selects ground clutter suppression mode of radar.

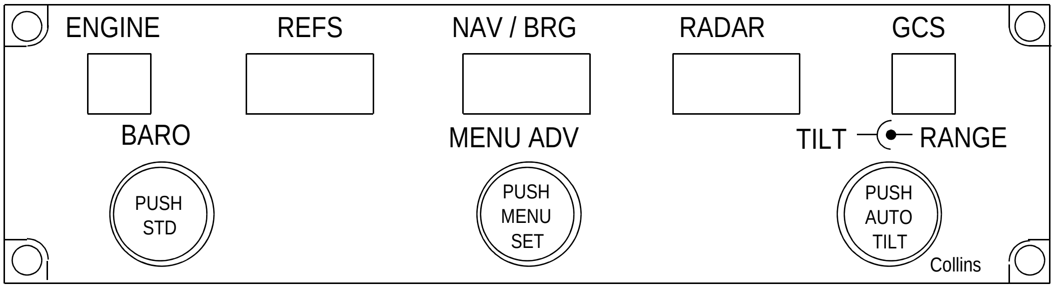

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Figure 7 (Sheet 1 of 2)
Display Control Panel (Airplanes prior to 258744 without Kits AAC-0409 and AAC-0410)

E. Display Control Panel (Airplanes Serial No. 258744 and After or airplanes with Kits AAC-0409 and AAC-0410)

The DCP has the rotary switches that follow (Ref. Figure 7, Sheet 2):

(1) BARO

- Turn the BARO knob to control the PFD BARO set readout.
- Push the PUSH STD button to exchange the BARO set value with the Standard (STD) pressure.

(2) MENU ADV/DATA

- Turn the MENU ADV knob to move the focus indicator to allow activation of various display items on the PFD.
- Turn the DATA knob to change the value located in the focus indicator window.
- Push the PUSH SELECT button to select (acknowledge) a new value set with the DATA knob. An item is deselected if the item is already selected, then PUSH SELECT is pushed. Subsequent pushes of the PUSH SELECT button selects or deselects the item.

(3) TILT/RANGE

- Turn the TILT knob to adjust the weather radar antenna vertical tilt angle. The selected angle (-15° to + 15°) shows with the letter T on the MFD. Clockwise rotation selects a positive tilt angle.
- Turn the RANGE knob to select the display range. Turn the RANGE clockwise to increase the display range and counterclockwise to decrease the display range. The available range settings are: 10, 25, 50, 100, 200 and 300 NM. If TCAS is installed, a 5 NM range is available. An optional 600 NM range is available.
- Push the AUTO TILT button to select the Auto tilt feature. The Auto tilt feature adjusts the antenna tilt angle to attempt to maintain the picture in the same area of the display. The Auto tilt feature is designed to reduce the number of times needed to adjust the tilt control while changing airplane altitude or range settings. The Auto tilt feature may be enabled continuously as the system always uses the current manual tilt setting as the starting point. The letter A shows with the tilt angle to indicate Auto tilt is selected.

The DCP has the push button switches that follow:

(4) ENG

- Push the ENG button to manually declutter the engine display. The N2, fuel flow, oil temperature, oil pressure and fuel temperature readouts and legends are removed. Push the ENG button again to show the engine parameters.

(5) REFS

- Push the REFS button to select the REFS menus on the PFD. When not airborne, push the REFS button to move through the REFS menu pages in the order that follows, V1, VR, V2, VFTO, VREF, MIN ALERT, BARO MIN and RA MIN. When airborne page 2/3 is the first selection.

(6) NAV/BRG

- Push the NAV/BRG button to show the NAV SOURCE and BRG SOURCE menus on the PFD. The NAV SOURCE menu shows the possible active navigation sources. FMS1, FMS2, VOR1/LOC1 AND VOR2/LOC2 annunciations are adjacent to the top left LSK.

  The BRG SOURCE menu shows the single-bar bearing pointer source and the double bar bearing pointer source. Repeatedly push the associated LSK to cycle through the possible bearing pointer selections. Possible bearing sources are OFF, FMS, VOR and ADF.

  Push the LSK once to select the active navigation source. The selected source annunciation is enlarged.

(7) RADAR

- Push the RADAR button to show the weather radar menus on the PFD. The left side menu shows the radar modes: STBY, TEST, MAP, WX, WX+T, TURB and STAB. The right side menu shows: GAIN, SEC SCAN and TARGET.

Push the RADAR MODE LSK to select the weather radar mode. The active mode enlarges when selected. The STBY mode shows the radar is on but not transmitting. The TEST mode shows the test display pattern. The MAP mode shows the ground mapping mode. The WX mode shows the weather mode. The WX+T mode shows weather and turbulence detection (WXR-854 only).

Push the TURB LSK to show only turbulent weather. The TURB mode has a 30 second time-out and returns to the WX+T mode.

The current GAIN setting shows in a box next to the GAIN legend. Turn the MENU SET knob to set the gain at NORM, ±1, ±2 or ±3. Push the SEC SCAN LSK to toggle the sector scan function ON or OFF. Push the STAB LSK to toggle the stabilization ON or OFF. Push the TARGET LSK to toggle the target alert function to ARM or OFF.

(8) GCS

- Push the GCS button to toggle ground clutter suppression ON or OFF.

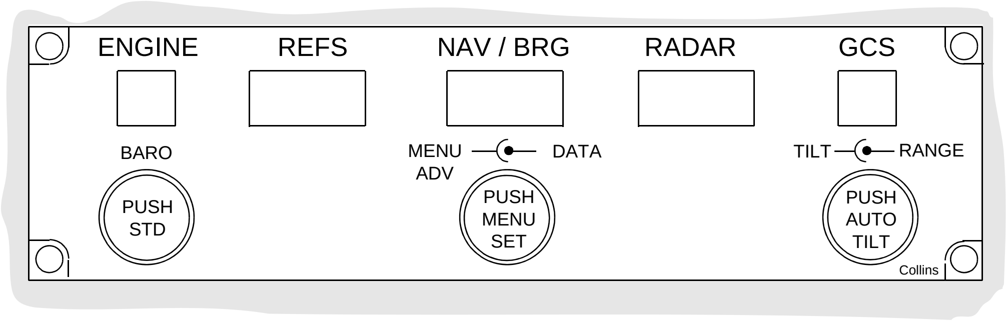

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Figure 7 (Sheet 2 of 2)
Display Control Panel (Airplanes 258744 and After or airplanes with Kits AAC-0409 and AAC-0410)

ELECTRONIC FLIGHT INSTRUMENT SYSTEM - REMOVAL/INSTALLATION

1. Electronic flight instrument system

A. Removal

(1) Open, safety clip and tag the relevant circuit breakers, before you remove an Adaptive Flight Display (AFD).

Panel	Label
DA-A	PFD1
DA-A	PFD1 HEATER
DA-A	MFD1 PRI
DA-A	MFD1 SEC
DA-A	MFD1 HEATER
DA-A	PFD2
DA-A	PFD2 HEATER
DA-A	MFD2 PRI
DA-A	MFD2 SEC
DA-A	MFD2 HEATER

(2) With a 0.093-inch hexkey drive loosen the two screws in the upper left and right corners of the bezel assembly and pull the bezel handle out to the open position.

(3) Carefully move the AFD out of the panel mount.

(4) Disconnect the mating connector cable assemblies and install dust caps to the plug and socket.

(5) Close the bezel handle and tighten the two screws in the upper left and right corners of the bezel assembly.

B. Installation

(1) De-energize the airplane busbars (Chapter 24, ELECTRICAL POWER).

(2) With a 0.093-inch hexkey drive loosen the two screws at the upper left and right corners of the display bezel and pull the bezel handle out to the open position.

(3) Remove the dust caps and connect the three mating connector cable assemblies to the unit rear connectors.

(4) Move the AFD into panel mount until the rails of the bezel handle engage the locking studs in the mounting tray.

(5) While you push on the front of the unit, raise the bezel handle until the locking mechanism latches.

(6) Attach the bezel handle in the locked position by tightening the two screws in the upper left and right corners of the bezel assembly.

NOTE: New AFDs will have a plastic film attached to the front of the screen. Make sure the film is removed before the AFD is used.

(7) Remove the safety clips and tags, and close the relevant circuit breakers opened in paragraph 1.A.(1).

(8) Clean the AFD screen (CLEANING/PAINTING).

(9) Do a PFD or MFD test (ADJUSTMENT/TEST).

C. Close up

(1) Make sure the work area is clean and clear of tools and miscellaneous equipment.

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
ELECTRONIC FLIGHT INSTRUMENT SYSTEM ADJUSTMENT/TEST

1. ELECTRONIC FLIGHT INSTRUMENT SYSTEM

A. Adjustment/Test

Airplanes without IFIS installed:

(1) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0780103, Maintenance Section Part No. 523-0780107 and do the test procedure for the PFD or MFD as required.

Airplanes with IFIS installed:

(2) Refer to Rockwell Collins Hawker 800XP Avionics System Manual Part No. 523-0807190, Maintenance Section and do the test procedure for the PFD or MFD as required.

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
INTEGRATED FLIGHT INFORMATION SYSTEM
DESCRIPTION AND OPERATION

1. INFORMATION
(EFFECTIVITY: AIRPLANE SERIAL NO. 258744 AND AFTER OR AIRPLANES WITH KIT 149-3438)

The Integrated Flight Information System (IFIS) provides electronic charts, graphical weather and map overlays such as geopolitical boundaries, airspace and airways. The IFIS also provides supplemental situation awareness information on the Multi-Functional Displays (MFDs). The electronic charts and map overlays features are standard and graphical weather is an operator purchased option.

2. DESCRIPTION

The File Server Unit (FSU-5010) is designed to be installed in a MMT-5000 equipment mount. The FSU-5010 provides three major functions:

- A file server functionality with databases.
- A computing platform on which the FSA-5000 software with operator purchased options will run.
- An Ethernet function that allows Ethernet communication with various LRUs.

The pilot and co-pilot MFDs communicate with the respective on-side FSU and Cursor Control Panel (CCP). The MFD accepts display lists from the on-side FSU for display. In the case of map data, the MFD merges the display list data with Flight Management System (FMS) map data.

The MMT 5000 equipment mount includes the external FSU cooling fan attached to the underside of the mount and the External Compensation Unit (ECU-3000) attached to the rear of the mount.

3. OPERATION

A. File server Unit

The File Server Unit (FSU) (Figure 1, Sheet 1 of 2) provides the computational capability to process data and convert it to display directives for display on the MFD. It also provides a means for on-airplane data load systems such as FMS and Maintenance Diagnostic Computer (MDC).

B. File Server Databases

IFIS uses charts, E-maps and graphical weather databases that are stored on the FSU, each database has a unique update cycle.

C. File Server Application

The File Server Application (FSA-5000) is the IFIS operating software. The FSA-5000, IFIS software contains functions that are activated by the operator through entry of the Encrypted Application Keys (EAKs).

EAKs are unique to each airplane and the associated installation instructions can be obtained from Rockwell Collins.

IFIS airborne equipment has separate part numbers for (FSU-5010) hardware and (FSA-5000) software. The software part number can be established and confirmed through the MFD.

FSA-5000 for Universal Weather or FSA-5000 for XM Weather, Part No. 810-0001-XXX has two software components, these being:

- COL_NODE, Part No. 815-5596-XXX
- COL_FSU, Part No. 810-0001-XXX

D. FSU External Compensation Unit

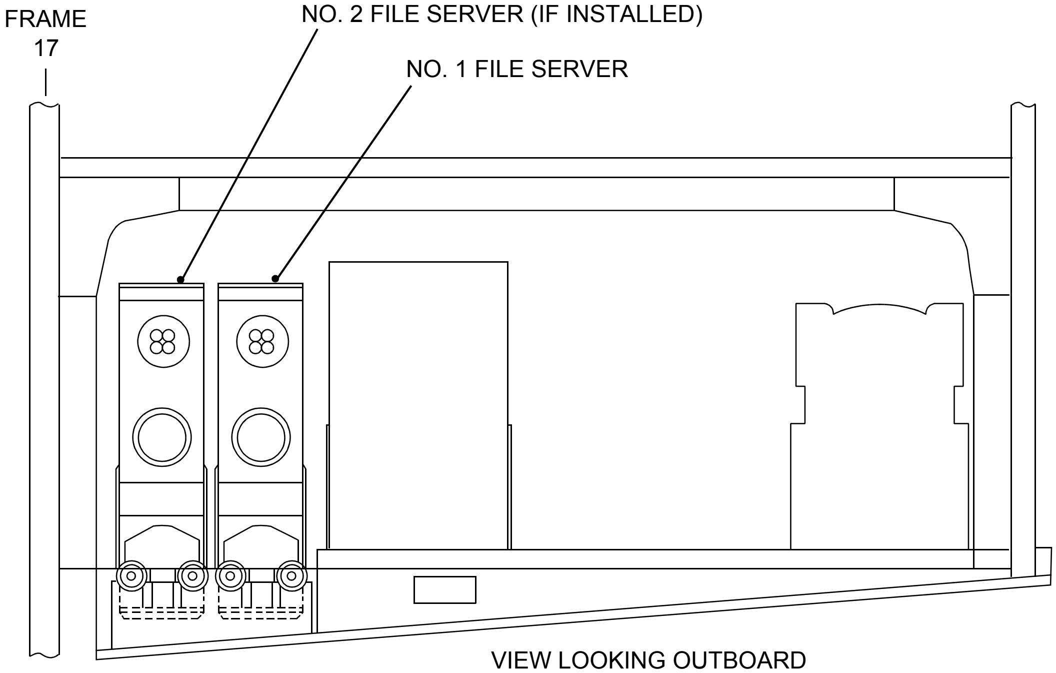
The External Compensation Unit (ECU-3000) (Figure 1, Sheet 1 of 2) contains memory used to store (read and write) IFIS configuration data such as operator purchased options. Operator purchased options are activated and de-activated using EAKs.

E. Cursor Control Panel

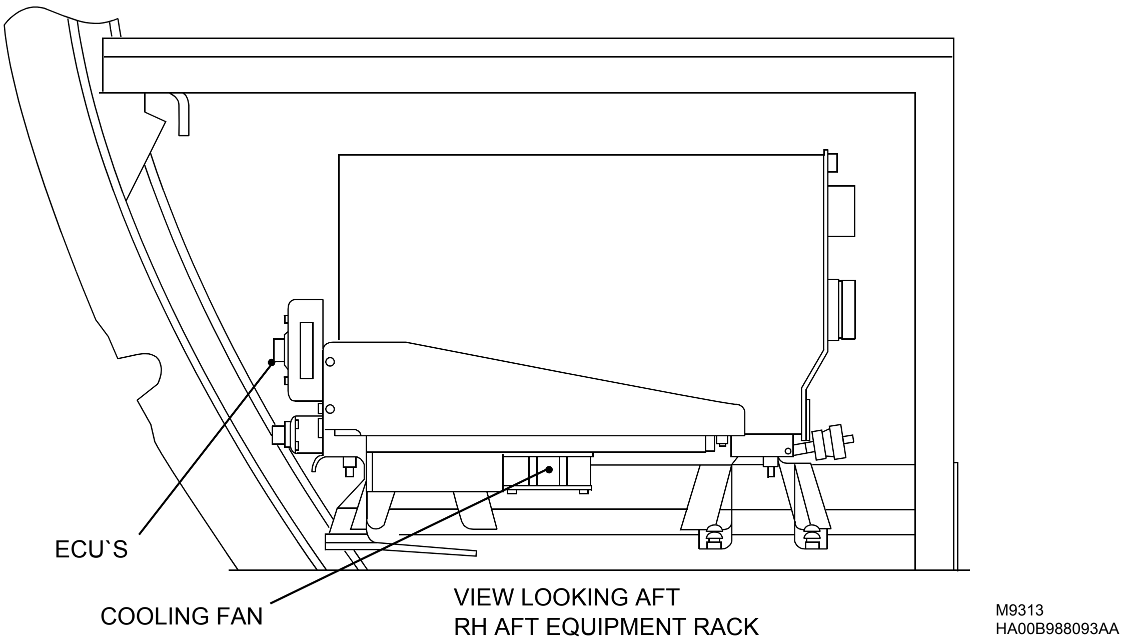
The Cursor Control Panel (CCP) (Figure 1, Sheet 2 of 2) interfaces with the on-side MFD and provides the additional control capabilities required to support IFIS display data or operator purchased option(s) software data.

F. 5 Volt Lighting Power Supply Units

Two 5 volt lighting power supply units (Figure 1, Sheet 2 of 2) provide 0-5 volt required for the CCPs internal lighting.

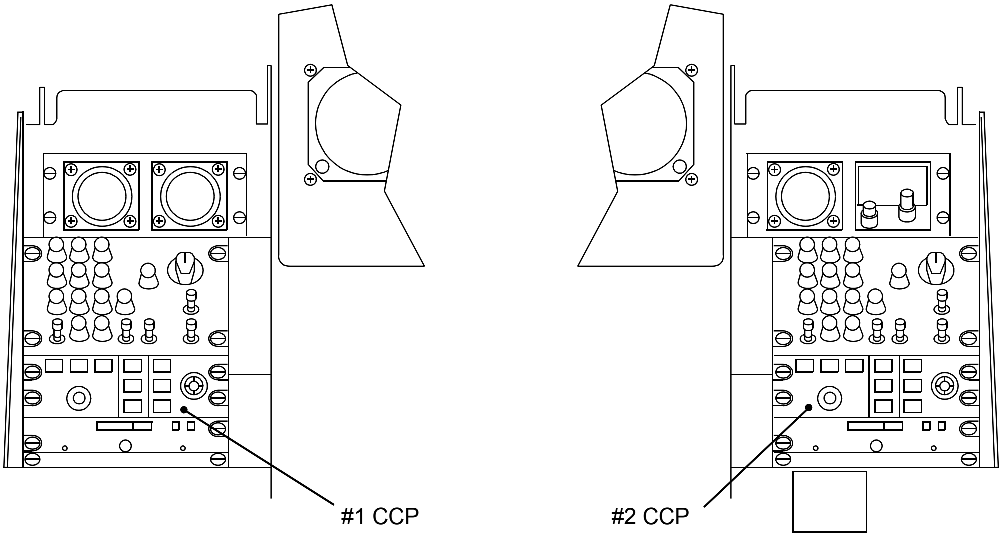


VIEW LOOKING OUTBOARD
RH AFT EQUIPMENT RACK



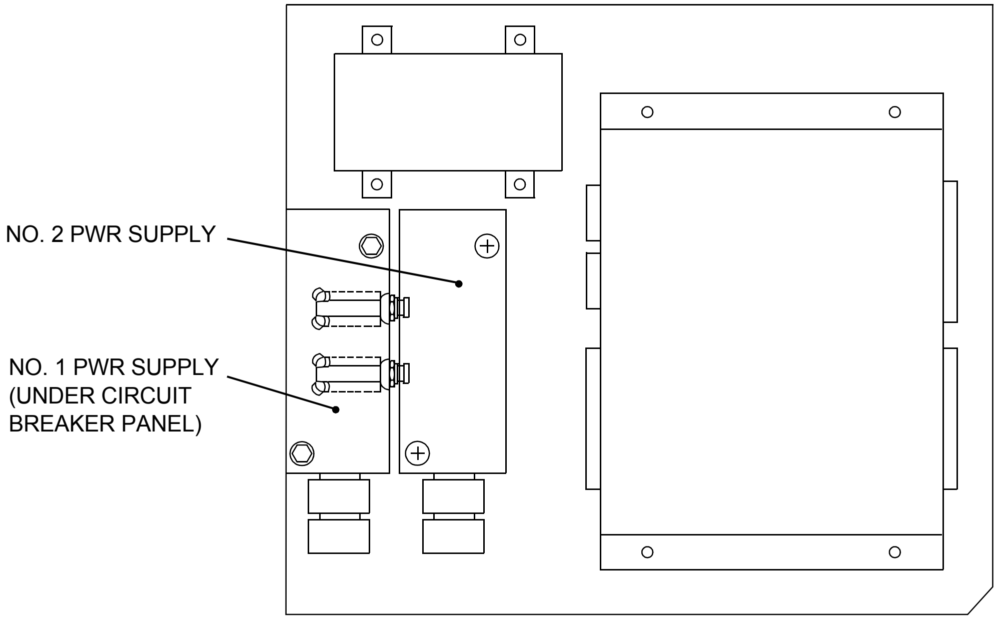
VIEW LOOKING AFT
RH AFT EQUIPMENT RACK

Figure 1 (Sheet 1 of 2)
Integrated Flight Information System Equipment Location



PILOT SIDE CONSOLE

CO PILOT SIDE CONSOLE



5 VOLT LIGHTING POWER SUPPLIES - AFT SIDE OF PANEL DA
BELOW FORWARD BAGGAGE COMPARTMENT FLOOR

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Figure 1 (Sheet 2 of 2)
Integrated Flight Information System Equipment Locations

NAVIGATION
FLIGHT MANAGEMENT SYSTEM
INTEGRATED FLIGHT INFORMATION SYSTEM
MAINTENANCE PRACTICES

1. INFORMATION (EFFECTIVITY: AIRPLANE SERIAL NO. 258744 AND AFTER OR AIRPLANES WITH KIT 149-3438)

Equipment/materials (With DBU-4100 Installed)	Part/Item No.
Generic PC or Laptop with CPAS CD Drive.	Local Supply
Ethernet Cross Over cable.	NF24Q100-01
Current and valid database.	Local Supply
CPAS software.	810-0032-002
FSA-5000 Universal Weather or FSA-5000 XM Weather.	810-0001-XXX

NOTE: If a DBU-5000 is installed, the CPAS equipment listed above is not installed. Data loads are accomplished via a USB port on the DBU-5000.

NOTE: Refer to the Rockwell Collins System Manual, P/N 523-0780103 for Integrated Flight Information System (IFIS) troubleshooting procedure.

2. FILE SERVER UNIT

A. Preliminary Procedures

	MECH	INSP
(1) Open, safety clip and tag the following circuit breakers (Ref. 24-01-00, 201): **Panel** — **Label** DA-A — FSU 1 PRI DA-A — FSU 1 SEC DA-A — FSU 2 (If installed)		
(2) Open the aft baggage/avionics compartment door.		

B. Removal

	MECH	INSP
(1) Do the preliminary procedures listed in paragraph 2.A.		
(2) Disconnect the two electrical connectors from the relevant FSU (Ref. Figure 201).		

	MECH	INSP
(3) Loosen the knurled knobs that attach the FSU to the equipment mount.		
(4) Carefully slide the FSU from the equipment mount.		
(5) Install protective caps or covers to the exposed electrical connections.		

C. Installation

	MECH	INSP
(1) Remove any caps or covers from the electrical connectors.		
(2) Carefully slide the FSU into the equipment mount.		
(3) Position the two knurled knobs on the front of the equipment mount to engage the hold down hooks and tighten to attach the FSU.		
(4) Connect the two electrical connectors to the relevant FSU.		
(5) Remove the safety clips and tags and close the circuit breakers (Ref. paragraph 2.A.).		

D. Adjustment/Test

	MECH	INSP
(1) Do the test procedure for IFIS (Ref. paragraph 6).		

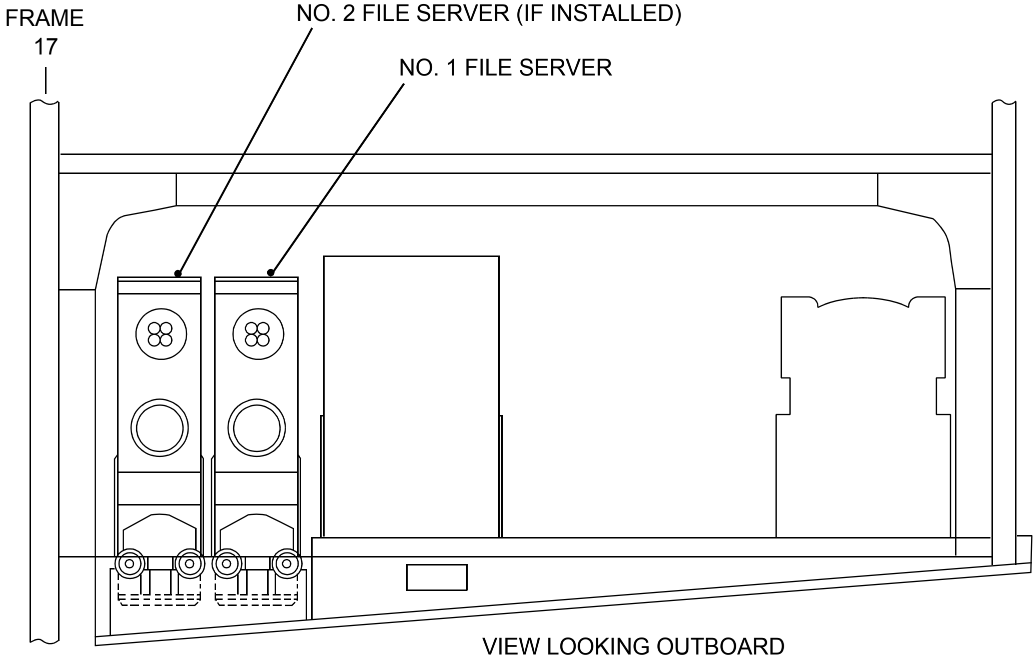
E. Close Up

	MECH	INSP
(1) Close and secure the aft baggage/avionics compartment.		
(2) Make sure the work area is clean and clear of tools and other equipment.		

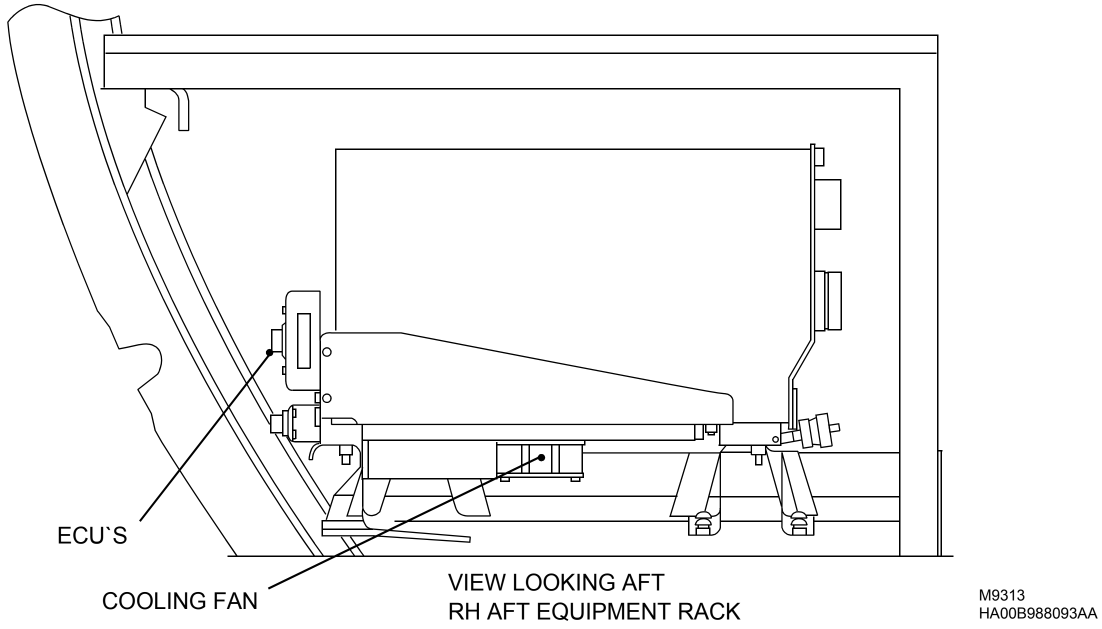
3. FILE SERVER UNIT - EXTERNAL COMPENSATION UNIT

A. Preliminary Procedures

	MECH	INSP
(1) Open, safety clip and tag the following circuit breakers (Ref. 24-01-00, 201): **Panel** — **Label** DA-A — FSU 1 PRI DA-A — FSU 1 SEC DA-A — FSU 2 (If installed)		
(2) Open the aft baggage/avionics compartment door.		



VIEW LOOKING OUTBOARD
RH AFT EQUIPMENT RACK



VIEW LOOKING AFT
RH AFT EQUIPMENT RACK

Figure 201
FSU and ECU Location

B. Removal

	MECH	INSP
(1) Do the preliminary procedures listed in paragraph 3.A.		
(2) Remove the FSU from it's equipment mount (Ref. paragraph 2.B.).		
(3) Remove the four screws that attach the equipment mount to the airframe (Ref. Figure 201).		
(4) Carefully move the equipment mount to get access to the ECU and the fan electrical connections. Disconnect the two electrical connectors.		
(5) Remove the equipment mount.		
(6) Remove the two screws and washers that attach the ECU to the rear of equipment mount. Keep the attachment hardware and equipment mount.		
(7) Install protective caps or covers to the exposed electrical connections.		

C. Installation

	MECH	INSP
(1) Put the ECU in position on the equipment mount and install the two screws and washers.		
(2) Remove any caps or covers from the electrical connectors.		
(3) Connect the electrical connectors to the ECU and to the fan on the equipment mount.		
(4) Put the equipment mount into position on the airframe rails and install the four screws.		
(5) Install the FSU to the equipment mount (Ref. paragraph 2.C.).		
(6) Remove the safety clips and tags and close the circuit breakers (Ref. paragraph 3.A.).		

D. Adjustment/Test

	MECH	INSP
(1) Do the test procedure for IFIS (Ref. paragraph 6).		

E. Close Up

	MECH	INSP
(1) Close and secure the aft baggage/avionics compartment.		
(2) Make sure the work area is clean and clear of tools and other equipment.		

4. CURSOR CONTROL PANEL

A. Preliminary Procedures

	MECH	INSP
(1) Open, safety clip and tag the following circuit breakers (Ref. 24-01-00, 201): **Panel** — **Label** DA-A — CCP 1 DA-A — CCP 2 **NOTE** Cursor Control Panel (CCP) No. 1 is on the left side console and CCP No. 2 is on the right side console (Ref. Figure 202).		

B. Removal

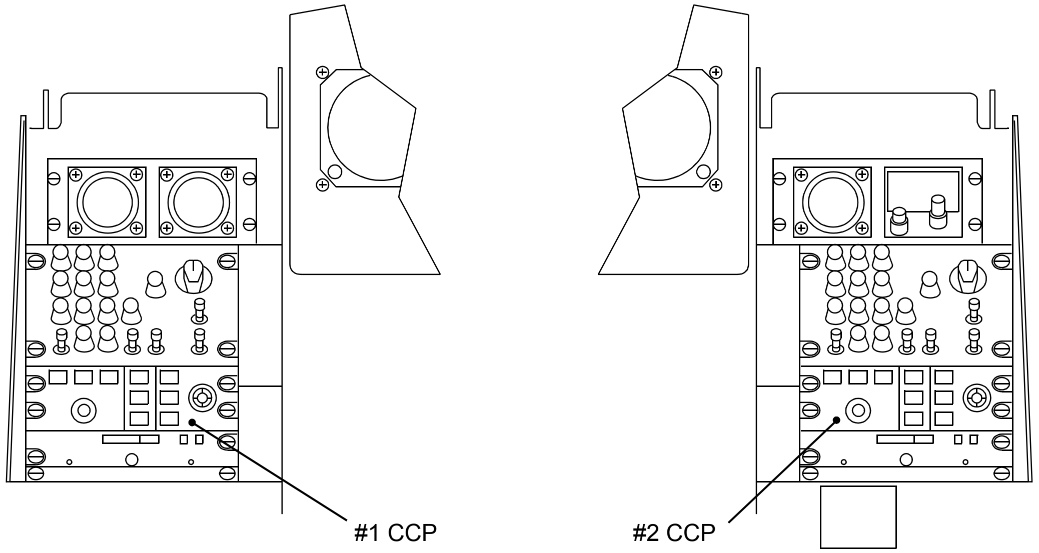
	MECH	INSP
(1) Do the preliminary procedures listed in paragraph 4.A.		
(2) Loosen the fasteners by a quarter turn counterclockwise to release the CCP.		
(3) Carefully lift the CCP from the side console.		
(4) Disconnect the electrical connector from the CCP.		
(5) Install protective caps or covers to exposed electrical connectors.		

C. Installation

	MECH	INSP
(1) Remove any caps or covers from the electrical connectors.		
(2) Connect the electrical connector to the CCP.		
(3) Carefully slide the CCP into the side console.		
(4) Tighten the fasteners by a quarter turn clockwise to attach the CCP.		
(5) Remove the safety clips and tags and close the circuit breakers (Ref. paragraph 4.A.).		

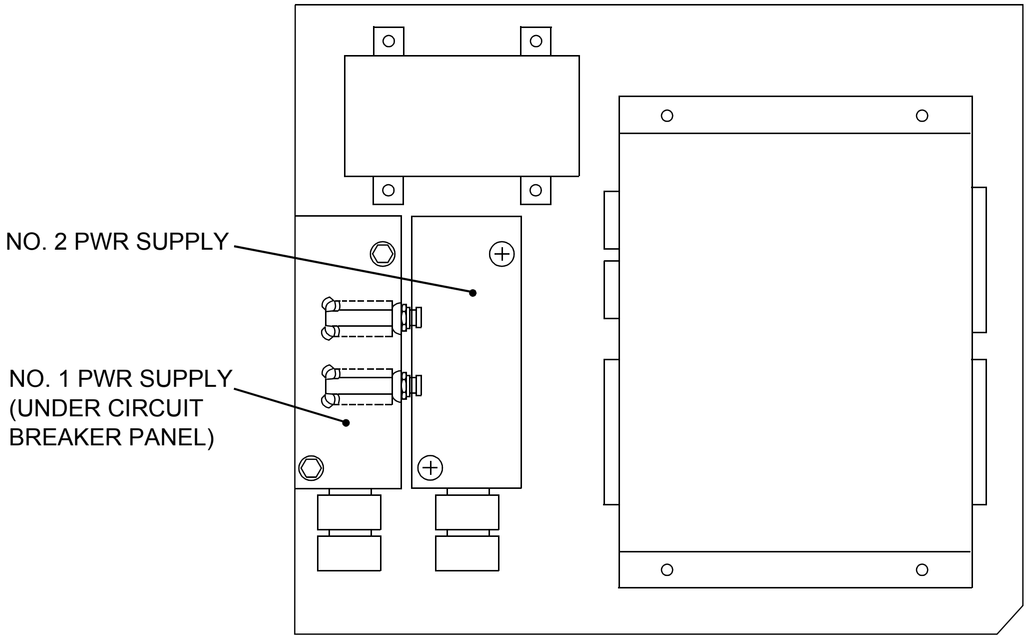
D. Adjustment/Test

	MECH	INSP
(1) Do the test procedure for IFIS (Ref. paragraph 6).		



PILOT SIDE CONSOLE

CO PILOT SIDE CONSOLE



5 VOLT LIGHTING POWER SUPPLIES - AFT SIDE OF PANEL DA
BELOW FORWARD BAGGAGE COMPARTMENT FLOOR

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Figure 202
CCP and Light Power Supplies - Location

E. Close Up

	MECH	INSP
(1) Make sure the work area is clean and clear of tools and other equipment.		

5. FIVE VOLT LIGHTING POWER SUPPLY UNITS

A. Preliminary Procedures

	MECH	INSP
(1) Open, safety clip and tag the following circuit breakers (Ref. 24-01-00, 201): **Panel** — **Label** DA-D — CCP 1 LTS DA-D — CCP 2 LTS		
(2) To get access to the 5 Vd.c. power supply units on the aft side of distribution panel DA, remove the forward baggage compartment forward closeout panel. Keep the equipment removed and the attachment hardware (Ref. MMA-800XP, 25-22-03, 201).		

B. Removal

	MECH	INSP
(1) Do the preliminary procedures listed in paragraph 5.A.		
(2) Disconnect the electrical connector from the relevant power supply (Ref. Figure 202).		
(3) No.1 power supply unit: (a) Loosen the two bolts that attach the circuit breaker panel and the power supply unit. **NOTE** There is a spacer installed, to each bolt, between the CB panel and the power supply unit. ***CAUTION*** *Do not damage or stretch the circuit breaker electrical wires.* (b) Carefully remove the bolts, CB panel spacers and power supply unit.		
(4) No.2 power supply unit: (a) Remove the two screws that attach the power supply unit and remove it from the mounting plate.		
(5) Install protective caps and covers to the electrical connectors.		

C. Installation

	MECH	INSP
(1) Remove any caps or covers from the electrical connectors.		
(2) No. 2 power supply unit: (a) Put the power supply unit in position over the mounting holes and install the two screws.		
(3) No. 1 power supply unit: ***CAUTION*** *Do not damage or stretch the circuit breaker electrical wires.* (a) Put the two bolts through the CB panel and install the spacer to each bolt. (b) Put the power supply unit in position over the mounting holes and install the bolts spacers and CP panel. (c) Make sure that the CB panel is in the correct position and tighten the two bolts.		
(4) Connect the electrical connector to the power supply.		
(5) Remove the safety clips and tags and close the circuit breakers opened (Ref. paragraph 5.A.).		
(6) Install the forward baggage compartment forward closeout panel (Ref. MMA-800XP, 25-22-03, 201).		

D. Adjustment/Test

	MECH	INSP
(1) Make sure that the relevant Cursor Control Panel (CCP) lighting operates correctly.		

E. Close Up

	MECH	INSP
(1) Make sure the work area is clean and clear of tools and other equipment.		

6. ADJUSTMENT/TEST

A. Review Integrated Flight Information System Configuration

NOTE: Make sure that the Encrypted Application Key (EAK) codes for the airplane are available. Ref. Flight Manual Supplement.

NOTE: Make sure that the Charts Subscription codes (if charts option is active) for the airplane are available. Ref. Flight Manual Supplement.

B. Procedure

	MECH	INSP
(1) Energize the airplane 28 Vd.c. busbars (Ref. 24-01-00, 201, Figure 201).		

Table 201
MFD/CCP - File Server Configuration Information

Action	Result
On the on-side CCP, push STAT key.	MFD displays STAT MENU
Using the MENU ADV knob, scroll to FILE SERVER CONFIGURATION and push SELECT.	MFD displays FILE SERVER CONFIGURATION page.
Make sure that the operator(s) ECH, GWX or OVL purchased options.	MFD displays enabled or disabled purchased options.
Through the CCP and MFD, enter the EAK from paragraph 1. to activate/deactivate purchased options.	On MFD rectangular box, highlighting an individual character in the ENTER KEYS block accepts the EAK entries. Upon entry of EAK, purchased option is activated/deactivated.

Table 202
MFD/CCP- Database Effectivity Information

Action	Result
On the on-side CCP, push STAT key.	MFD displays STAT MENU.
Using the MENU ADV knob, scroll to DATABASE EFFECTIVITY and push SELECT.	MFD displays DATABASE EFFECTIVITY page.
Make sure that the databases listed are current and valid. If databases are not valid, perform Integrated Flight Information System Database Loading procedure (Ref. paragraph 7).	MFD displays valid and current databases.

Table 203
MFD/CCP - Chart Subscription Information

Action	Result
On the on-side CCP, push STAT key.	MFD displays STAT MENU.
Using the MENU ADV knob, scroll to CHART SUBSCRIPTIONS and push SELECT.	MFD displays CHART SUBSCRIPTION page.
Make sure that the operator(s) chart subscriptions are active.	MFD displays enabled chart subscriptions.

Table 203
MFD/CCP - Chart Subscription Information (Continued)

Action	Result
Through CCP and MFD, enter chart subscription codes from paragraph 1. to activate subscriptions.	On MFD, rectangular box to the ADD REGIONS section accepts the code entries. Upon entry of subscriptions, code is activated/deactivated.

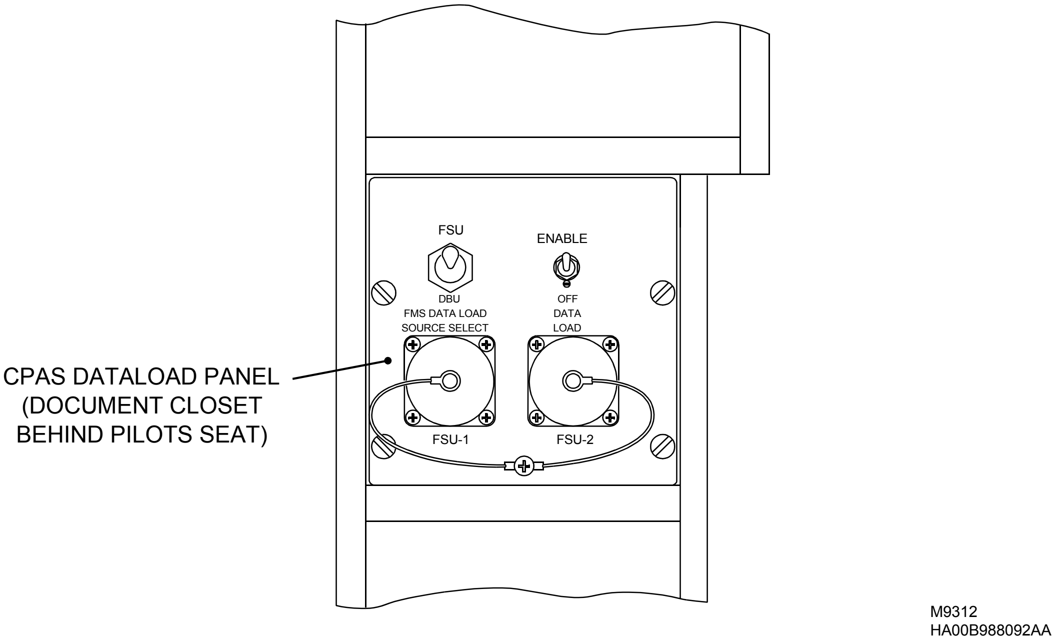

Figure 203
Integrated Flight Information System Equipment Locations

C. Close Up

	MECH	INSP
(1) De-energize the airplane 28 Vd.c. busbars.		
(2) Make sure the work area is clean and clear of tools and other equipment.		

7. INTEGRATED FLIGHT INFORMATION SYSTEM DATABASE LOADING

A. Preliminary Procedures

NOTE: If a DBU-5000 is installed, skip the following steps in paragraphs 7.A. and 7.B. and go to paragraph 7.C.

DBU-4100 INSTALLED ONLY	MECH	INSP
(1) Get access to the Maintenance/Dataload panel. Use the Ethernet cross over cable and appropriate LRU jack (Ref. Figure 203), connect the CPAS Laptop: **Panel** — **Label** MAINTENANCE/DATALOAD — FSU 1/FMC/MDC MAINTENANCE/DATALOAD — FSU 2 (If installed)		
(2) Turn CPAS Laptop on. Make sure that the circuit breakers that follow are closed: **Panel** — **Label** DA-A — FSU 1 DA-A — FSU 2 (If installed)		
(3) Energize the airplane 28 Vd.c. busbars (Ref. 24-01-00, 201, Figure 201).		

B. Database Loading (DBU-4100 Only)

CAUTION: *COL-NODE must be loaded before COL_FSU for a successful load of the FSU.*

	MECH	INSP
(1) Do the preliminary procedures listed in paragraph 7.A.		
(2) On the CPAS Laptop, launch CPAS by selecting LAUNCH PAD.		
(3) On Maintenance/Dataload panel set DATALOAD switch to ON.		
(4) On the CPAS Laptop use TARGET LRU/LRU TO BE UPDATED drop down menu to select [COL_NODE]. (Ref. Collins CPAS-3000 Data Loader Manual, Collins Part No. 523-0790386)		
(5) On the CPAS Laptop use TARGET LRU/LRU TO BE UPDATED drop down menu to select [COL_FSU]. (Ref. Collins CPAS-3000 Data Loader Manual, Collins Part No. 523-0790386)		
(6) Set DATALOAD switch to OFF.		

C. Database Loading (DBU-5000 Only)

	MECH	INSP
(1) Energize the airplane 28 Vd.c. busbars (Ref. 24-01-00, 201, Figure 201).		
(2) Push the IDX line select key to show the INDEX1/2 page.		
(3) Push the NEXT line select key to show the INDEX 2/2 page.		
(4) Push the DB DISK OPS line select key to show the DATA BASE DISK OPS page.		
(5) Insert the USB storage device with the database into the USB port.		
(6) Push the READ DISK line select key.		

	MECH	INSP
(7) Push the select key for the database that is to be loaded.		
(8) Follow the instructions on the CDU display. The display shows the status of each step in the database loading process. The display also annunciates when the loading operation is complete, then shows the STATUS page.		
(9) If other FMCs require the same database load, return to checklist step 1 and proceed from that FMC's CDU.		

D. Adjustment/Test

	MECH	INSP
(1) Push the STAT key on the CCP associated with the FSU loaded.		
(2) Using MENU ADV, scroll to DATABASE EFFECTIVITY page on MFD.		
(3) Push SELECT button on the CCP.		
(4) Make sure that the current and valid database is displayed on the MFD.		
(5) Do the test procedure for the IFIS (Ref. paragraph 6).		

E. Close Up

	MECH	INSP
(1) De-energize the airplane 28 Vd.c. busbars.		
(2) For DBU-4100 only, disconnect the Ethernet cable from the CPAS Laptop and data/load panel. For DBU-5000 only, remove the USB storage device from the USB port.		
(3) Make sure the work area is clean and clear of tools and other equipment.		

8. FILE SERVER UNIT - FILE SERVER APPLICATION SOFTWARE LOADING

A. Preliminary Procedures

NOTE: If a DBU-5000 is installed, skip the following steps in paragraphs 8.A. and 8.B. and go to paragraph 8.C.

DBU-4100 INSTALLED ONLY	MECH	INSP
(1) Access the maintenance/dataload panel. Use the Ethernet cross over cable and appropriate LRU jack (Ref. Figure 203), connect the CPAS Laptop: **Panel** — **Label** MAINTENANCE/DATALOAD — FSU 1/FMC/MDC MAINTENANCE/DATALOAD — FSU 2 (If installed)		

DBU-4100 INSTALLED ONLY	MECH	INSP
(2) Turn CPAS Laptop on. Make sure that the circuit breakers that follow are closed: **Panel** — **Label** DA-A — FSU 1 DA-A — FSU 2 (If installed)		
(3) Energize the airplane 28 Vd.c. busbars (Ref. 24-01-00, 201, Figure 201).		

B. Software Loading (DBU-4100 Only)

CAUTION: *COL-NODE must be loaded before COL_FSU for a successful load of the FSU.*

	MECH	INSP
(1) Do the preliminary procedures listed in paragraph 8.A.		
(2) On the CPAS Laptop, launch CPAS by selecting LAUNCH PAD.		
(3) On Maintenance/Dataload panel set DATALOAD switch to ON.		
(4) On the CPAS Laptop use TARGET LRU/LRU TO BE UPDATED drop down menu to select [COL_NODE]. (Ref. Collins CPAS-3000 Data Loader Manual, Collins Part No. 523-0790386)		
(5) On the CPAS Laptop use TARGET LRU/LRU TO BE UPDATED drop down menu to select [COL_FSU]. (Ref. Collins CPAS-3000 Data Loader Manual, Collins Part No. 523-0790386)		
(6) Set DATALOAD switch to OFF.		

C. Database Loading (DBU-5000 Only)

	MECH	INSP
(1) Energize the airplane 28 Vd.c. busbars (Ref. 24-01-00, 201, Figure 201).		
(2) Push the IDX line select key to show the INDEX1/2 page.		
(3) Push the NEXT line select key to show the INDEX 2/2 page.		
(4) Push the DB DISK OPS line select key to show the DATA BASE DISK OPS page.		
(5) Insert the USB storage device with the database into the USB port.		
(6) Push the READ DISK line select key.		
(7) Push the select key for the database that is to be loaded.		
(8) Follow the instructions on the CDU display. The display shows the status of each step in the database loading process. The display also annunciates when the loading operation is complete, then shows the STATUS page.		
(9) If other FMCs require the same database load, return to checklist step 1 and proceed from that FMC’s CDU.		

D. Adjustment/Test

	MECH	INSP
(1) Push the STAT key on the CCP associated with the FSU load.		
(2) Using MENU ADV, scroll to FILE SERVER CONFIGURATION.		
(3) Push the SELECT button on the CCP.		
(4) Make sure that the FSA Part Number 810-0001-XXX for the software loaded.		
(5) Do the procedure for INTEGRATED FLIGHT INFORMATION SYSTEM DATABASE LOADING.		
(6) Do the test procedure for IFIS (Ref. paragraph 6), PURCHASED OPTIONS ACTIVATION/DEACTIVATION.		
(7) Record the FSA Part No. and ECU Serial No.		

E. Close Up

	MECH	INSP
(1) For DBU-4100 only, disconnect the Ethernet cable from the CPAS Laptop and the dataload panel jack. For DBU-5000 only, remove the USB storage device from the DBU USB port.		
(2) Record FSA Part No. and FSU position (FSU 1 or 2) in the airplane maintenance records. **NOTE** When the FSA is loaded into the FSU, make certain that the software Part No. is correct against the Equipment list and logged in the airplane maintenance records before the airplane is returned to service.		
(3) De-energize the airplane 28 Vd.c. busbars.		
(4) Make sure the work area is clean and clear of tools and other equipment.		